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Deliverable D36: Business model proposals for the REACH system and sub-systems: Presentation of the outcome of the detailing of business models for system and sub-systems (associated with task T8.4).

Abstract: This deliverable report focuses on the exploitation of the results and solutions from the REACH2020 research project and subsequent business models, associated with task **T8.4**. In particular, this report gives an overview of the progress regarding the purpose and planning of a REACH consultancy firm, including business models and marketing strategies for systems and sub-systems. Moreover, this report provides insight into possible market segmentation solutions over the care continuum. Furthermore, status updates are provided with regard to a number of practice cases where REACH achieved external visibility and effects and gathered information on the alignment of its business system. Furthermore, the results for exemplary value chains are presented for specific REACH sub-systems. For the exploitation of the results after the end of the research project, an agreement for future collaboration was signed with the New North Zealand Hospital, reflecting REACH's capability and aim to become a major player and partner for strengthening the ecosystem around future smart hospitals.

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Tasks of the involved partners with respect to the deliverable (and respective tasks) presented in this report:

Partner	Short task description
TU/e	• Overall strategy of deliverable • Value chains • Practice cases: TP3
TUM	• Strategy and structure of deliverable • Alignment of deliverable with responses to the Rs • Coordinating work towards REACH spin-off • Solutions for ecosystems around smart hospitals and agreement with NZH • Practice cases: MAIA, Invis, EuGMS, GIES
DTU	• Practices cases: Copenhagen symposium and exhibition …
Sturrm	• Scaling down and simplifying the REACH structure • Marketing strategy and landing pages • Market segmentation
BZN	• Practice cases: TP3 • Factors and value chains around nutritional aspects
SC	• Support with development of business strategy and balance marketing claims vs. needs for medical certification
AM	• Support with market segmentation and development of marketing strategy and scenarios • Practice cases: TP3 • Practice cases: Invis, EuGMS
Arjo	• Support with market segmentation and development of marketing strategy and scenarios • Develop marketing claims for systems and sub-systems
Philips	• Support with market segmentation and development of marketing strategy and scenarios
DTU	• Practices cases: Copenhagen symposium and exhibition

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Key expressions

Abbreviations for partners:

AH: ArjoHuntleigh
AM: Alreh Medical
CU: University of Copenhagen
DTU: Technical University of Denmark
EPFL: École Polytechnique Fédérale de Lausanne
HUG: Hôpitaux Universitaires de Genève
SC: SmartCardia
SK: Schön Klinik
TU/e: Eindhoven University of Technology
TUM: Technical University of Munich
ZZ: ZuidZorg

Activation: Physical and cognitive activation before an incident or way to keep patient as long as possible in a good baseline health state.

Activities of Daily Living (ADLs): Activity categories (e.g. dressing, bathing, feeding, etc.) which are necessary to maintain care independent living.

Ambient sensors: Sensors not worn on the body but integrated into the environment, everyday objects, PI²Us, etc., primarily supply in REACH the context and labelling.

D: Deliverable report.

End-user: Elderly citizen that are supposed to profit from reach services and products.

M: Project month within the project duration (e.g. M19 refers to project month 19, namely August 2017)

Modularization: As defined, for example by (Baldwin & Clark, 2000), modularization can be considered as a means to control the internal complexity of a system e.g. by reducing and clarifying the interfaces between system elements.

Personalized Intelligent Interior Units (PI²Us): Smart furniture which is used to integrate the REACH concepts and functionality seamlessly into the different REACH use case settings. In a broader sense, Touchpoints will mainly materialize as “furniture”, i.e., elements that can be placed and moved within a particular environment or setting (e.g., beds, bathroom furniture, mobile walkers/standers, large-scale interfaces, smart flooring tiles, smart tables, etc.). Additionally, the Touchpoints will also appear as ambient sensor add-on modules and wearables.

Physical Activity: Target condition of REACH. The systemized early detection and intervention-based prevention of physical inactivity and sedentary behavior in a variety of care settings such as homes and everyday life, day care centers, and other geriatric facilities will not only significantly reduce the risk of LTC admissions and re-admissions (and thus as targeted by REACH reduce overall healthcare cost) but also increase the elderly’s functional performance, social participation, independence, and quality of life.

Stakeholders: In REACH the term “stakeholders” refers to the entire network and the diversity of players, partners, shareholders, stakeholders, end users, organizations,

companies, institutions, and others that relate to, act in, are impacted by, and/or are interested in the activities, developments, and goals of the project.

T: Task defined in the project proposal.

Touchpoints/Engine concept: structures the envisioned REACH product-service-system architecture, into manageable research and development clusters.

Touchpoints: The “Touchpoints” will act as “graspable” front ends towards the end users (elderly). The Touchpoints will serve as data gathering devices and as mediators of services and interventions coordinated by the Engine towards the end user. Each Touchpoint is modular and made up of several subsystems which allow adapting the system both for a particular person or setting, as well as over time.

TRLs, IRLs, SRLs: The concepts of Technology Readiness Levels (TRLs; see, for example, **(NASA, 2012)**, and System and Integration Readiness Levels (SRLs/ IRLs, see, for example, **(Sauser, et al., 2006)**) can be used to track the maturity of the implemented sub-systems and their interfaces and integration with each other. In addition, project management can facilitate a successful system integration.

Use case setting: Use case setting refers to the four solution operators, and this report refers to them as use case settings since they reflect concrete application scenarios.

WP: Work package defined in the project proposal.

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1 Introduction

REACH creates new market opportunities for European industry, including SMEs to capitalize on European high-tech-knowhow, to make Europe a market leader in prevention technologies, meanwhile tackling the ultimate cause of rising healthcare expenditures.

1.1 REACH overall hypotheses and goals

REACH develops, matures, and integrates products, processes, and solutions that seek to prevent older citizens from loss of function and decline as a major cause of physical inactivity. As such, the REACH system transforms clinical and care environments such as homes and everyday life, day care centers and other forms of care into highly personalized and data-driven early intervention systems that engage older people in preventative and rehabilitative activity, primarily physical activity but also with regard to cognitive, mobility, social and nutritional aspects (see **Figure 1-1**).

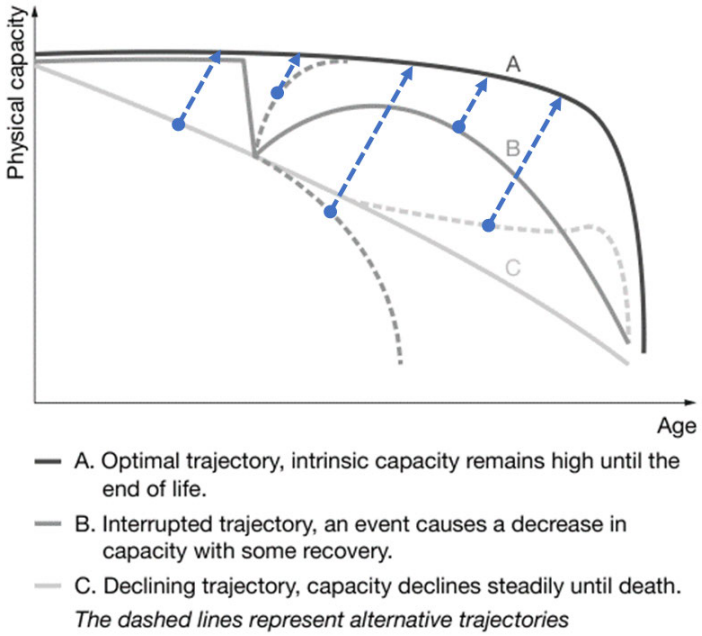


Figure 1-1: REACH solutions help to modify and optimize trajectories of physical capacity (image adapted from WHO "World Report on Ageing and Health")

1.2 REACH toolkit and Touchpoints

The REACH toolkit guides the technical implementation of REACH. The toolkit comprises a series of partially independent components or "raw elements" developed by the partners, which can be classified into 11 categories (sensors, analytics and ML-tools, devices, smart furniture, exercise and behavior change schematics, human-machine-interfaces, data storage platforms etc.). REACH has developed and refined a design methodology (Sensing-Monitoring-Intervention/SMI workflow) for the use case specific combination and integration of these elements (see **Figure 1-2**).

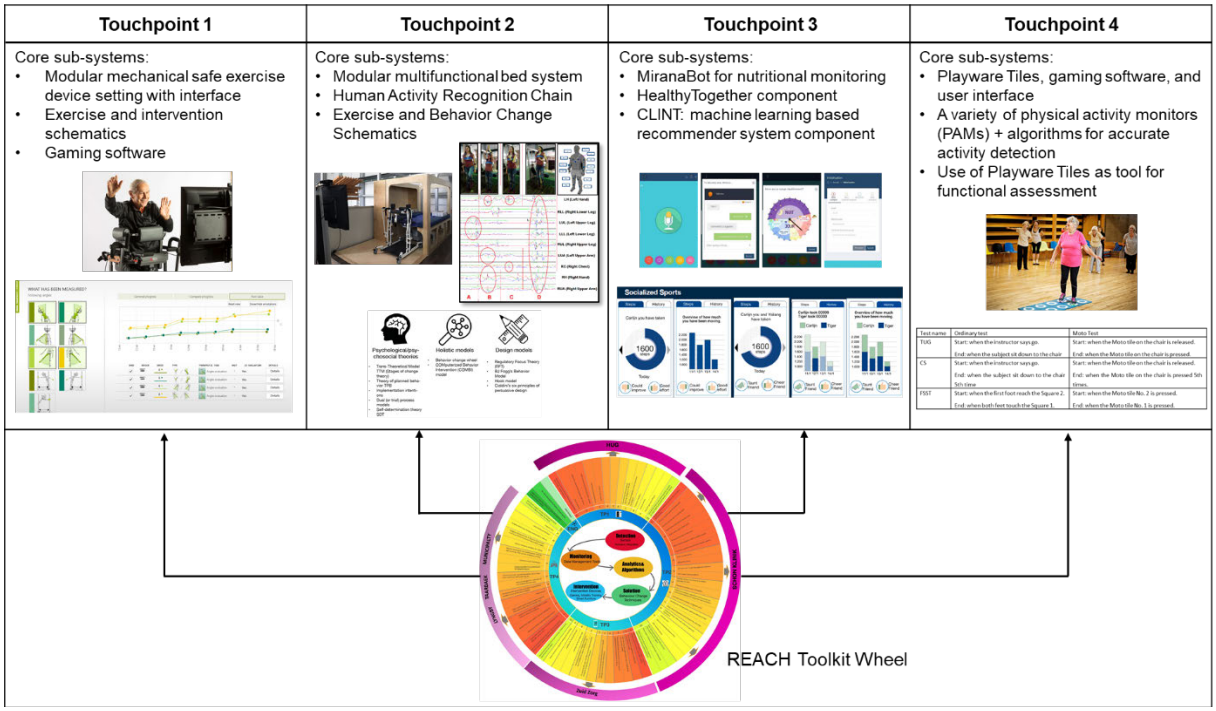


Figure 1-2: REACH Toolkit Wheel and its connection to the four Touchpoints

The REACH toolkit approach allows the tailoring of solutions that create value for end-users, care providers and health care payers alike. It does so through the combination, integration and adaptation/re-design of its elements towards the different contexts of different countries, different payment and reimbursement structures (e.g., insurance or tax-based), specific use case settings and processes and, most importantly, individual end-user needs and capabilities. (SK/Schön Klinik, HUG/Geneva Hospital, ZZ/ZuidZorg, Lyngby/Lyngby Municipality). In this context, REACH demonstrates its ability to integrate, cross-integrate, share and interchange its elements (e.g. several Touchpoints share standard elements that were, to a certain extent, adapted to the use case setting) and co-create (REACH believes that the ability to identify, incorporate and design / develop new case-specific elements for each use case setting is important to the achievement of useful and appropriate solutions.).

1.3 Ecosystem approach and system verification and validation by trials

REACH achieves its objectives through highly integrated sensing-monitoring-intervention chains representing comprehensive solutions that are exemplarily and iteratively adapted in the project to the ecosystems of a series of care settings throughout Europe (homes, hospitals, care homes, day care facilities, communities, etc.) for older individuals. REACH implements, demonstrates, tests, and validates (by more than 27 small- to medium-sized trials) through those settings, customized and personalized instances of this chain. A unique feature of REACH is the integrated utilization of personalized behavior change and engagement techniques informing about the development of the products and solutions (sensors, interfaces, devices, etc.).

REACH implements a combination of wearable and ambient sensors for each Touchpoint along with a set of co-adapted Machine Learning elements. Machine Learning is used as a core element in multiple ways, e.g. to predict Activities of Daily Living (ADLs), recognize physical activity and behavior trends, detect deviations of patterns and crit-

ical situations, cluster and profile people, and inform the effectiveness of the assignment of certain interventions. Personalized Intelligent Interior Units (PI²Us; smart furniture devices) are used to seamlessly integrate the above described functional elements into daily life in the different target use case settings. Last but not least, REACH has developed practices and schematics to assess the implications of the use of its solutions with regard to privacy, legal, and ethical aspects in order to ensure technology acceptance by end-users, caregivers, and other care and medical professionals (see **Figure 1-3**).

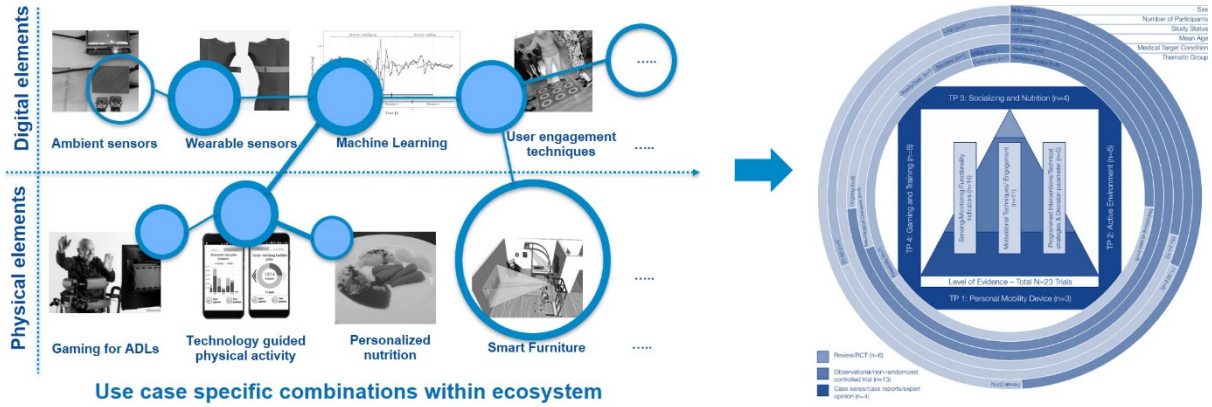


Figure 1-3: Ecosystem approach and system verification and validation by trials

1.4 REACH to market: a simplified structure

In order to work towards market implementation REACH needed to clarify and sharpen the medical purpose of its solutions, develop a regime for market segmentation, facilitate the preparation of medical certification and IPR protection activities, and define concrete business and marketing procedures.

1.4.1 Medical purposes

- **Touchpoint 1:** System: Prevent, maintain, and restore balance, muscle strength, and muscle endurance. Patients: Patients who already have mild to moderate limitations due to polyneuropathy, stroke, advanced age, incomplete cross sections, or mild cognitive impairment. Environment: Care homes, rehabilitation institutions, day care environments, offices of occupational and physical therapists, etc. Use under the supervision of instructed personnel; no 1:1 care necessary.
- **Touchpoint 2:** System: The system is intended to facilitate patient mobilization and help monitor vital signs and potentially dangerous situations. Simultaneously, it should recognize when a patient needs stronger nursing or therapeutic support and then support him or her in the partial takeover of activities. Patients: Patients with moderate to high restrictions of self-care (Activities of Daily Living) and / or with motor and / or cognitive impairment due to a neurological, medical or other disabling disease. Environment: Hospital or other nursing environments. System is able to alert a specialist, care professionals, or other skilled or semi-skilled personnel. Use in the absence of skilled or semi-skilled personnel, which only has to be available nearby.
- **Touchpoint 3:** System: App for behavior detection/monitoring, analysis, and modification. Patient: Healthy or not seriously ill people, especially in adulthood.

The system can also be used under medical supervision to improve the treatment of chronic diseases (diabetes, sedentary lifestyle, obesity, etc.). Environment: Everyday environment up to assisted living. Use if necessary, on the recommendation of a doctor.

- **Touchpoint 4:** System: A training guide to improve walking movement capability, gait safety, stability, endurance, and selective leg movements. The system is also able to capture and monitor parameters of gait safety (balance), walking speed, and endurance for functional assessment purposes and to detect physical activity trends and critical situations. Patient: People with gait and stability limitations while still able to walk. Environment: For groups of older people in sports groups and in day care facilities and for self-training. Can also be used for input measurement for allocation to suitable programs and groups.

1.4.2 Market segmentation

For business and marketing purposes, a simplified REACH structure includes and scales down the solutions developed as part of the Touchpoints in four major target market segments (see **Figure 1-4**):

- For developers of new products
- For health care institutions
- For homes
- For communities

Techniques from the field of motivational segmentation and behavior change are used to further sub-classify these segments and link them to REACH solutions.

Figure 1-4: Preliminary draft of the REACH consultancy firm website

1.4.3 Technology management

REACH develops products that are allocated at the intersection between medical and non-medical products. REACH therefore evaluates the market potential for each solution, classifies its solutions and develops associated roadmaps and regimes for medical certification. These activities are supported by REACH's active involvement and lead in numerous standardization frameworks on national, European (CEN), and worldwide (ISO) levels.

1.4.4 Business and marketing

REACH is currently preparing the formation of a "REACH Active Ageing GmbH" which will serve beyond the project as an integrator of REACH partner's individual products and services and a solution provider to above named market segments.

1.5 Tasks and overview of tasks and activities related to T8.4/WP9/D36

This deliverable report focuses on the exploitation of the results and solutions from the REACH2020 research project and subsequent business models, associated with **Task T8.4**. The main content of this report is structured as follows.

1. **Next steps towards the market:** This chapter outlines recent progress towards the creation of a consultancy company, including business model and marketing strategy.
2. **Market segmentation and solution matrix:** For the business strategy and market access, we developed a toolset to guide the decision-making process.
3. **Practice cases:** We provide an overview of several practice cases, where REACH gained visibility with third parties, e.g. the general public or among professionals.
4. **Exemplary outlines of value chains for TP3:** Co-creation workshops gave us the opportunity to develop exemplary value chains in the context of **TP3**.
5. **REACH and the ecosystems around future smart hospitals: the New North Zealand hospital case:** REACH is involved with the global trend for smart hospitals. An agreement for future collaboration was signed with the cutting-edge New North Zealand Hospital in Denmark,

This deliverable implicitly addressed the reviewer recommendations (Rs) as follows:

R	General topic of R	Addressed in this deliverable in:
R9	Consider scaling down and simplifying the REACH structure	Chapter 2
R10	Consider consulting additional business and marketing experts	Chapter 2
R11	Work towards a REACH consulting & engineering spin-off	Chapter 2
R13	Work towards a component/solution selection system (matrix or similar)	Chapter 3
R14	Expand practicability of TP3 (e.g. include nutrition markers)	Chapter 4
R20	Practice cases that work towards demonstrating business feasibility	Chapter 4
R23	Personalized solutions	Chapter 2, Chapter 3

As a result of the tasks and activities related to **Task T8.4**, as described in this document, significant progress was made towards an exploitation and potential market introduction of the solutions and results of the REACH research project. This includes major steps towards the creation of a consultancy company, business models, value chains and marketing strategies, as well as future exchange and collaborations with third parties.

2 Next steps towards the market – REACH Consultancy: business and marketing strategy

In order to bring the solutions of the REACH research project to the market, it is planned to create a REACH consultancy firm as a spin-off, with the goal to enable active ageing in health care institutions, communities and homes across Europe. To facilitate the business aspects and generate visibility in the public, we developed a business and marketing strategy which was presented first on the "To Market" workshop on October 7, 2019 at TUM in Munich.

2.1 Towards REACH GmbH (consulting, engineering, solutions) – business strategy (internal view)

First of all, we formulated the REACH statement that serves as the company motto and sets out the main goals of the future company: *"We are Reach. We combine cutting edge technology, knowledge and experience of our various partners to provide consultancy and solutions to promote active ageing across Europe and beyond."*
This means in particular, that we generate solutions of ideas, concepts and products that help to keep elderly in good health. With a proactive approach, we aim to reduce pressure on ever-rising healthcare costs and therefore society. The target groups for "technology-enabled active aging" are first and foremost institutions, communities and private homes.

Currently, the three use cases in the focus of the REACH consultancy are as follows:

Mobility training equipment
The first use case has the goal to minimize frailty and to prevent mild cognitive impairment and is aimed to be marketed to communities. The unique selling propositions (USPs) of the REACH solution in this regard are fun through gaming software, best effects by combining cognitive triggering in physically active situations, forgetting physical boundaries/obstructions, sit to stand is crucial for elderly independence (i.e. toileting, getting out of bed).

Modular and smart rehabilitation room
The goal of the second use case is to prevent stroke readmission and to promote a new lifestyle, as well as to cope with dementia and create independence. This is mainly aimed at neuro rehabilitation clinics and the transition to home. The USPs are to prolong influence and care over the patient, it is easy to use similar devices/equipment in a home as in a clinic and to stay training, as well as to reduce down time and to maximize exercise time in the patient room itself, in addition to connecting to (informal) caregivers and patient environment.

Elderly lifestyle application.
The third use case aims to promote physical activity (to minimize Sarcopenia), mental activity (to prevent MCI), and social inclusion (to prevent loneliness), mainly in the context of the home environment.

In order to create a suitable business strategy, we examined the context (i.e. trends, technology factors, laws and regulations, competition, risks and customer needs, as well as economic factors. We formulated our ambition (i.e. to generate an ecosystem

focused on tech solutions for active aging) and defined the next steps and challenges. Based on this we developed a business model and defined our value proposition (i.e. *"An experienced and knowledgeable ecosystem on technical solutions for active ageing."*), key elements (i.e. partners, activities and resources), customer segments, relationships, communication channels, as well as cost structure and revenue streams. In addition to this, a process was specified. More information can be found in the **Appendix** to this deliverable.

In addition, we devised a plan for the year 2020. In the first quarter we are working to round off REACH research consortium. This includes disseminating all further knowledge to the consultancy firm the team. The second quarter of the year will be dedicated to acquiring funding and to building marketing. Funding will happen through both the consortium and further public or private investors (e.g. the EU). In the second half of the year, we will find and launch first customers or first projects to start. We envision to scale up business and support (i.e. the support structure for the REACH consultancy) in the fourth quarter of 2020.

2.2 Scaling down and simplifying the REACH structure – marketing strategy (external view)

As a first step to introduce the REACH consultancy and to improve visibility in the market, the consortium is working on a website (the design was showcased at the workshop), an interactive slide show, flyers for the three target groups, a poster, high-quality photographic material, and a translation of the material for different markets (e.g. Germany). Specimen of the new flyers and posters according to the new corporate communication strategy can be seen below (**Figure 2-1**).

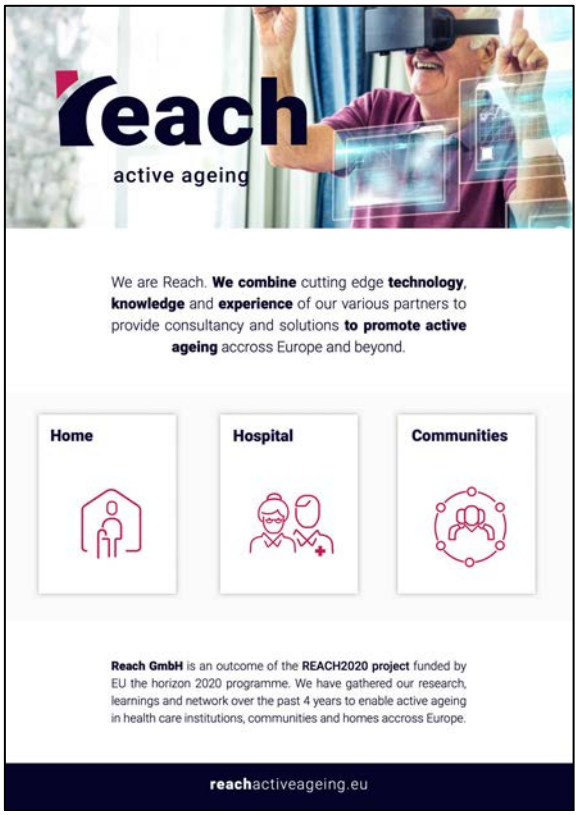


Figure 2-1. New designs for posters and flyers for the REACH consultancy.

3 Market segmentation solution matrix based on behavioral classification of users and decision makers

In the REACH workshop on packaging/marketing, medical certification, IPRs, and practice cases on October 7th and 8th, 2019, the participants (e.g., TUM, Sturrm, Arjo, Alreh, SmartCardia, SK, and Philips) co-create a Market Segmentation Solution Matrix based on Philips' archetypes, the Censydiam model theory, and the Care Continuum.

The workflow of usage of this solution matrix is as such: a care solution scenario will be defined in a Care Continuum which contains care processes such as prevention, diagnosis, treatment, home care, and healthy living in a closed loop. Then the potential customers or key stakeholders in that care solution scenario are divided into groups based on their different characteristics (e.g., the pragmatist, the engaged, the achiever, and the safe-keeper). After the key stakeholders' architypes are defined, various behavior change techniques (e.g., the adoption curve, behavior change journey, etc.) can be applied to these key stakeholders. The next important step is to select the appropriate system components developed in REACH as the solution to those defined scenarios. The REACH Toolkit Wheel including all technologies and techniques (e.g., sensors, smart furniture, interfaces, etc.) developed in REACH provides a comprehensive solution pool for the selection process. These combinations of components then will be used to tackle the various defined care solution scenarios (e.g., prevention, hospital rehabilitation, care home, etc.).

The workflow of this market segmentation solution matrix is illustrated below in detail, see **Figure 3-1**.

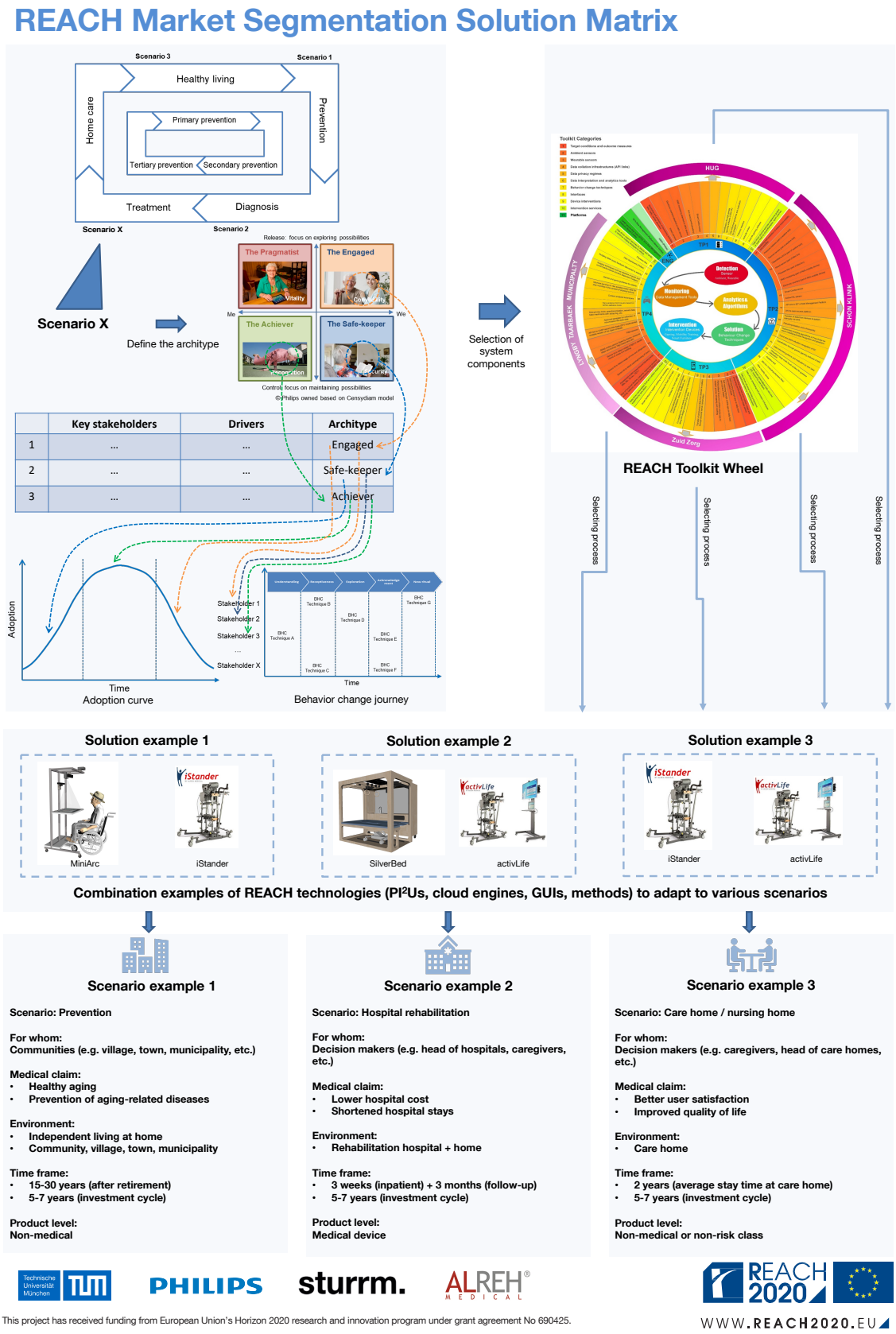


Figure 3-1. REACH Market Segmentation Solution Matrix.

4 Practice cases

4.1 Practice cases TP3: towards a full value chain for TP3

On Oct 28th, the Touchpoint 3 (TP3) team gathered in Eindhoven to update on each other's development and discuss the reviewers' comments. Participants included Thomas Linner from TUM, Mirana Randriambelonoro from HUG, Alxandru Rusu and Ann-Kristin Scharwze from BioZoon, Peter Lovei from Philips Design, Hubert Cornelis from Ontmoet en GroetHuys, Carlijn Valk, Mar Cirera Sole, Lu Yuan from TU/e. The agenda of the workshop was as follows.

- 9:00-9:30 Arrival and coffee and thee
- 9:30-10:30 Update from each partner about past development
  - 9:30-9:50 TUM update on the past business model workshop in Munich
  - 9:50-10:10 TU/e on insights on personalization strategies
  - 10:10-10:30 BioZoon update on personalized food and input on including weight, BMI and serum albumin as nutrition makers and control of nutrition intake
  - 10:30-10:50 HUG update on MiranaBot and input on BMI and serum albumin as nutrition makers and control of nutrition intake
- 10:50-11:20 Break
- 11:20-11:50 General reflection on results obtained and final reporting (update the TP3 SIM flow if necessary)
- 11:50-12:20 What's next, life after REACH, intro of workshop this afternoon
- 12:20-13:00 Lunch

A short summary of the workshop is given below.

4.1.1 Project update

Thomas provided a short update on the business model workshop in Munich in early Oct 2019. He especially discussed the importance of identifying medical purposes of TP3 in de overall development and commercialization of the REACH system. Since TP3 is about creating interventions to stimulate healthy eating behavior in a social setting for older adults, the medical purposes here refer to the expected impact that TPs can potentially contribute to professionals in care contexts such as caregivers, chef, and dietitian, and informal caregivers such as volunteers and families and friends in terms of improving their work efficiency and reduce work related stress.

Carlijn updated everyone about the in-depth analysis of the continue test in Eindhoven with the focus on personalizing behavior change strategies toward stimulating active ageing. The continue test was organized last summer with two groups of older adults which would use two different behavior change strategies (self-awareness and social awareness). The experiment lasted for 9 weeks, in which the first 4-week was the baseline test and the last five-weeks was the intervention test. A product-service-system approach was taken to establish a platform to make this experiment feasible. Volunteers and researchers worked together to facilitate the entire experiment. A mobile app was co-created with the older adults with two different intervention possibilities. Information on participants age, gender, self-reported confidence in using a smart phone, stage of change, self-efficacy, and social efficacy was collected. By means of the wearable activity sensor (FitBit Flex 2), step data during both the baseline and

intervention phases of the study was collected. The analysis of the collected quantitative and qualitative data suggested that the self-awareness BC strategy might effectively address people with low phone confidence, at an earlier stage of change and of advanced age. While the social awareness strategy might be used to address people, who are already in the preparation stage, more effectively.

Mirana provided a brief report of the development of MiranaBot. MiranaBot is a conversational agent that helps the chronically ill patients to be aware of their eating habits in terms of variety and regularity. Rather than focusing on food quantity and nutritional value, the system targets the variety of the individuals' diet. From a regular description of the elderlies' meals during a certain period, "MiranaBot" is able to assess the quality of their nutrition, identify the foods they need to consume less and explain why and how to replace them. The system proposes personalized solutions tailored to the older adults' needs and context. A qualitative study was conducted with 13 patients and health professionals who helped us identify the main barriers as well as the needs and requirements for adopting a healthy nutrition behavior. To understand patient's barriers for adopting a healthy nutrition, we first observed 4 consultation sessions led by a physician at the therapeutic education center. In addition, a group of 10 patients for one-week period was followed, while they came to the center for a workshop to learn about their disease. To inquire about their needs and their issues, a focus group with the patients was conducted, and the first prototype of the application was presented to them. A semi-structured interview with one physician and two nutritionists was held. This helped us understand the real issues faced by the patients as well as the complexity of nutritional behavior change. The nutritionists participated in creating the nutritional database, which was use later in the application. The prototype was developed through an iterative process, following the agile development principles. A first prototype was developed. Changes were quickly implemented according to the participants feedback and in collaboration with them. The research results showed that lack of regularity, lack of variety, false belief and hunger unawareness were identified as the main barriers to healthy nutrition; whereas monitoring, education, empowerment and practicality were identified as the main needs and requirements for nutrition behavior change. These findings allowed us to suggest the appropriate behavior change techniques to be used in our systems, which are self-monitoring, personalized visual feedback, goal setting, self-awareness and personalized education. Finally, these were translated into a set of functionalities that build up to construct our final solution: MiranaBot.

Alexandru updated the team on their literature review of integrating BMI into TP3 and using Serum Albumin as the nutrition marker for TP3. According to ESPEN diagnostic criteria for malnutrition, not only weight loss and BMI, but also fat free mass index (FFMI) are used as define malnutrition into three subgroups. The first subgroup includes all patients with a BMI lower than 18.5 kg/m2. The second subgroup includes all patients with weight loss of more than 10% (indefinite of time) or more than 5% over the last three months and a BMI<20 kg/m2or<22 kg/m2 in patients under or above the age of 70, respectively. The third subgroup includes all patients with weight loss of more than 10% (indefinite of time) or more than 5% over the last three months and a FFMI of<15 kg/m2 and<17 kg/m2 in females and males, respectively. This implies that BMI and/or FFMI can be used as a reliable indicator for malnutrition, in combination with weight loss. Albumin is the most abundant protein in human serum. Serum Albumin was found in earlier studies a good predictor of surgical outcome. However, it has been criticized as a player in nutritional assessment due to its lack of specificity and

long half-life (approximately 20 days), especially for older adults. Serum prealbumin was found associated with malnutrition. Therefore, the conclusion is that in TP3 should integrate BMI but not serum albumin for nutrition assessment.

Specifically, HUG will include weight follow up and BMI in MiranaBot, a multiplatform web application with functionalities that allow the users to understand their nutritional habits in terms of variety and regularity, to identify bad eating habits, and to receive personalized recommendations about their diets. MiranaBot is not specifically going into details regarding the quantity of food eaten, but it would be very interesting for us to look at the correlation between the variety and the regularity of the nutrition and the evolution of the BMI.

Within the personalized food module for elderly designed by Biozoon, the BMI of women and men was considered as under limit point of orientation for the calculation of the daily amount of nutrients. In case of sarcopenia (low muscle function and low muscle mass) an additional amount of protein is calculated within the diet. Since high protein demand is mostly connected with low muscles/ sarcopenia, the current diet design at BioZoon does take this related protein demand into account but will not use serum albumin as a nutrition marker.

4.1.2 Update TP3 poster

As already suggested by Thomas, including medical purpose in the TP3 poster is important to communicate much clearly the values that TP3 aims to create, not only for the older adults (the primary user) but also for the caregivers, dietitians and chefs, for example. Therefore, the TP3 poster has been updated with a strong focus on the values that TP3 is creating than how and what products and services that TP3 is creating. The updated poster is listed below (**Figure 4-1**).

Figure 4-1. Touchpoint 3: Socializing & Nutritional Monitoring.

The workshop was successfully completed with mind ready for the workshop in the afternoon in which new project proposal opportunities around TP3 will be further defined as well as the expected value network.

4.2 Practice cases TP1: list and description of practice cases

An overview of recent research activity with regard to the practice cases in TP1 is provided below, in **Table 4-1**.

Table 4-1. Overview of recent research activities in TP1.

Place	Purpose of research	Description	Results
Mazowiecki Szpital Bródnowski Zespół Oddziałów Neurologii **Masovian Hospital- Bródno Neurology Department**	The aim of the study was to evaluate therapy using Active Life among patients with Parkinson's disease - mainly balance therapy	Inclusion criteria - Age range 55-70 (or other) - Patient walking alone - Patient who can go to the hospital for therapy (in particular for the group exercising on the platform) - Stable Parkinson's (3-10 years of diagnosis) Exclusion criteria - Disorders of the musculoskeletal system hindering therapy - Absolute contraindications for rehabilitation Test methods: Static balance assessment (Tecno-Body platform), Dynamic balance assessment (equivalent tests), Reaching test (FRT), Gait and fall risk assessment (TUG), 3 minute walking test (3 MWT), Functional Strength Test (FST stand up test)) Assessment of quality of life (Parkinson's Disease Questionnaire - PDQ-39) Assessment of patient motivation (Elderly Motivation Scale)	
DPS Pleszew SOCIAL WELFARE HOME	• -to assess the impact of this kind of therapy (multimedia platform training) among senior people with MCI • to assess the attractiveness of therapy with activLife in a group of 60+ users living in a Social welfare home • to assess the functional change among the users after the activLife training (using standardized geriatric functional tests and questionnaires)	The study has been conducted in August. First part is already finished: final measurements and tests of a first group has been taken 2.10.2019. Methods: 1) SPPB (4m) Short Physical Performance Battery 2) BIA 3) Hand Grip 4) MMSE Mini–Mental State Examination 5) WHOQOL-BREF-THE WORLD HEALTH ORGANIZATION. QUALITY OF LIFE 6) SES (Rosenberga) Self-esteem scale 7) GDS Geriatric Depression Scale (8) MNA-SF Short-Form Mini Nutritional Assessment Study group: 25 participants in the age 60+, who live in Social welfare home in Pleszew. Intervention: Personalized training program with activLife device 3 times/week for 20 minutes (8	First observation showed that participants with lower cognitive functions are willing to do exercises with activLife device and are unexpectedly good in performing the training programs. Based on this observation the researchers decided to recruit 25 more patients with lower cognitive functions for deeper analyze this group of users (MCI).

Place	Purpose of research	Description	Results
		weeks)	
IKARD - cardiology institute	Incorporating physical activity into daily life is one of the key elements of prevention and treatment of cardiovascular diseases, which remain the most common cause of death worldwide. Diversifying physical training and adapting it to existing trends helps to encourage cardiac patients to regularly perform physical activity. The study aims to evaluate effectiveness and attractiveness of exercises carried out on ActivLife© - a device that consists of a platform, a screen, a computer, and a Kinect© camera, and is used to perform individual exercises while playing console games.	Methods: The sample group comprised of 26 people: 9 female patients and 17 male patients, whose average age was 60 ± 12 years old. The average body mass was 84 ± 19 kg and the average BMI was 28 ± 5. Among the patients we studied, 15 suffered from HF, 12 had HTN, 5 had CIED implanted, 11 suffered from ACS, and 3 went through CABG. The patients took part in a standard inpatient Phase II of cardiac rehabilitation (support and counseling from health specialists, breathing, stretching, strength exercises, cycle ergometer or treadmill training), enriched with the use of ActivLife©. The trainings with ActivLife© were performed 5 times a week, once a day for 15 minutes, and included a set of 7 exercises. In this study, resting and exertional HR and BP, as well as Borg CR10 scale, were measured and compared in the same patients depending on the method of physical training (ActivLife© vs. cycle ergometer). After ActivLife, improvement in patients' range of motion (ROM) and speed of exercise completion were also evaluated. To analyze patients' results nonparametric statistical tests were used (Kendall's Coefficient of Concordance for longitudinal observations and Wilcoxon Signed Rank Test for intergroup comparisons).	Results: Statistically significant differences were noted between the results of six following ActiveLife trainings: increased speed of exercise completion in “Squats” exercise (Kendall´s W = 0,272; p< 0,001); increased speed in “Boxer” exercise (Kendall´s W = 0,241; p< 0,001); improved percentage of ROM: in left lower limb mobility exercise (Kendall´s W = 0,252; p< 0,001), in right lower limb mobility exercise (Kendall´s W = 0,148; p< 0,01); and in balance exercise (Kendall´s W = 0,482; p< 0,001). Level of fatigue measured with Borg CR10 scale didn't differ between trainings on ActivLife© and cycle ergometer. However, in following trainings using ActivLife© level of fatigue significantly decreased (Kendall´s W = 0,147; p< 0,01). Exercise systolic blood pressure (SBP) and diastolic blood pressure (DBP) were significantly lower in sixth training on ActivLife© in comparison to sixth training on cycle ergometer (Wilcoxon's Z= -3,744; p< =0,001 for SBP; and Wilcoxon's Z=-2,791; p< 0,01). Using ActivLife© improved ROM and speed of exercises performed by patients. It also caused lower levels of SBP and DBP in sixth training on ActivLife© in comparison to sixth training on cycle ergometer. ActivLife in an interesting and safe device for individual trainings. Incorporating it in an inpatient and outpatient cardiac rehabilitation may benefit in a good additive or a substitution of exercise therapy.
HUG Geneva University Hospitals	The purpose of the study was to use the ActivLife device in hospital training of geriatric patients and the impact of this therapeutic method on the activity of these patients after discharge from the hospital	A personal mobility device for elderly physical rehabilitation: non-inferiority randomized clinical trial of efficiency in the treatment of patient with musculoskeletal issues. Participants: Inclusion criteria Seniors (65+) hospitalized in one of the sites involved, with a minimal level of independence and strength (FIM >= 4 for the items regarding mobility	• SPPB(end of hosp.): improved by 1+/-1.5 pts(I) vs 1.92+/-1.94 pts(C) • SPPB(after 3 weeks at home): improved by 1.78+/-2.29 pts(I) vs 1.5+/-2.21pts(C) • IHGS(end of hosp.): improved by 1.2+/-3.40 kg(I) vs 1.42+/-4.22 kg(C) • IHGS(after 3 weeks at home): improved by 2.53+/-4.27kg(I) vs -2.16+/-3.97kg(C) • in general patients steps activity increased

Place	Purpose of research	Description	Results
		and locomotion) and a minimal level of cognitive ability (MMSE>=27) to be able to interact with the equipment AND hospitalized at least 3 weeks at one of the hospitals. Exclusion criteria Patients too weak to interact with the equipment and staying less than 3 weeks at the hospital. Patient in need of specific exercise treatment.	once they got home (some patients kept the same number of steps, a few decreased their activity), • qualitatively patients who were in the intervention group seemed more active than the control group (doing more activity indoor and outdoor) but no significant difference when we look at the number of steps, • after 3 weeks at home average increase in SPPB intervention group > SPPB control group. • Activation device engaging elderly in physical and cognitive activity as a simultaneous combination is the most effective tool in prevention and rehabilitation of older adults. • Effect of intervention rehabilitation is non inferior to the effect of standard rehabilitation for the 3 chosen outcomes (SPPB, IHGS, number of steps).
ANIN IKARD	The limited physical activity and aging of patients with cardiovascular disease (CVD) causes reduction of muscular strength, coordination, and motion, balance. Therefore, there is a need for incorporating new rehabilitation forms covering those areas into Cardiac Rehabilitation. The aim of the study was to assess the effectiveness, safety, and attractiveness of exergames with the Kinect camera and fall protection equipment (activLife) in trainings of CVD patients.	Methods The study group consisted of 46 consecutive patients with various CVD (after myocardial infarction, cardiosurgical procedure, with heart failure) admitted to the Department of Cardiac Rehabilitation. All subjects participated in four-week program with standardized trainings (endurance training and general conditioning exercises with elements of resistance and balance exercises). 20 patients (group A) were offered additional trainings (five times per week) with the use of activLife. Before and after rehabilitation all patients underwent tests assessing the strength of lower limbs, 6MWT, and the Up&Go test. Patients also filled out a questionnaire regarding use of activLife.	Results Both groups significantly improved in all tests: strength of lower limbs [number of repetitions/30 sec] – group A: 11.21± .61 vs 13,37±3.96, p <0.001; control group: 9.96±3.34 vs 13.12±3.99, p <0.001; 6MWT [m] – group A: 369.06±129.1 vs 462.50±104.88, p <0.03; control group: 366.53±121.76 vs 457.81±102.2, p <0.006; Up & Go test [sec] – group A: 7.74 ± 2.75 vs 6.74±1.8, p <0.006; control group: 8.35±2.75 vs 7.27±3.51, p <0.006. There was also significant increase in the precision and speed of movements in subsequent trainings. 94.7% of patients evaluated activLife as “very good”, 89.5% - “comfortable/very comfortable”, 100% - safe, 79.0% - useful in achieving rehabilitation goals and 68.4% assessed it as more attractive than standardized training.

Place	Purpose of research	Description	Results
			Conclusions 1. Cardiac rehabilitation using exergames is seen by patients as attractive, safe, and useful in achieving their goals. 2. Although the test results has improved for both groups, there is a need for longer observation and increased training time to reliably compare effectiveness of both forms of training. 3. The activLife device is safe and useful for cardiac rehabilitation.
SK Bad Aibling			
Zuid Zorg Eindhoven	Investigate whether the motivation to do more physical activity is the same for seniors who use activLife and for those who follows the advices from the physiotherapists at home Show an improvement in certain clinical "outcomes" such as physical strength, balance, and risk of falls after the use of mobility activLife and after following standard physiotherapist recommendation at home	Test Participants: Group 1: 21, 11 females and 10 males, with an average age of 78.05 Group 2: 22, 8 females and 14 males, with an average age of 75.82 Group 1 Intervention with assignment from physiotherapist at home (8weeks) These participants did several exercises with written instruction and advices from physiotherapist. Group 2 Intervention 1 with activLife (8 weeks)These participants were using the activLife equipment for 8 weeks, guided and supported by the sport coach. The training was performed twice a week for 30 minutes each time. Each participant received a test map which consisted of: -Introduction and explanation of the exercises and questionnaires -Training program, schedule for 8 weeks. With a personalized time program for each participant for the support of the sport coach	The test participants were from a rather physical active group with comparable TFI, stage of change measurement, a hand grip test result (which is the sign of frailty). The activLife training improves the 4-stage balance test and 30sec chair stand test results. Exercises provided in the training program gave the participants opportunity to practice sit-ups and balance in a safe standing position. As there is no walking exercise in the activLife training program it does not sufficiently improve the Tinnetti Gait Assessment results. The study results showed a huge role of a sport-coach in elderly engagement process to be more physically active. Exercise alone at home has a higher barrier to be active score than exercise together with a sport-coach support. Based on the knowledge and experience gained during the testing study in ZuidZorg, it can be concluded that Intervention should start by personal involvement of a „sport-coach" and develop towards new social and training habits. Activity Centers like ZuidZorg have a great potential to be an "early detection center" to monitor the level of activity of the elderly. An individual intervention program should be implemented quickly enough to protect the elderly against progressive inactivity (Fig.20). For the next steps it should be defined which functional geriatric tests are the most applicable to be an early detection tool and reliable

Place	Purpose of research	Description	Results
			measurement of the elderly condition
Wroclaw Medical University		PhD thesis in the field of frailty prevention. Pre-frailty patients attending ambulatory run by the Medical University are currently attending the tests.	
School of Health, Care and Social Welfare in Eskilstuna, Sweden	A study would be run in Eskilstuna municipality day care centers	Target: People with intellectual disabilities (ID). People with ID are following the demographic trend with an increasing population of older people. However, the group of people with ID have worse health, especially mental health and they die at younger ages. One explanation of this is that the group do not live as healthy as the non ID group. The have lesser possibilities to physical activities and health preventions do not reach their group. The test groups are adults with intellectual disability working at a day care center Monday – Friday and their staff. We plan a single case study with about 10 participants. We plan to collect both quantitative and qualitative data. The measures we are considering are: chair stand test, goniometer, Rombergs' test and six minutes walking test, 6MWT. Time: December 2019 – May 2020	
Katedra i Zakład Medycyny Rodzinnej Wrocław, ul. Syrokomli 1	Improving muscle strength, balance and memory of the elderly with frailty syndrome or those at risk of developing it using a fall prevention device (ActivLife) with a Kinect sensor.	The study relies on carrying out movement and cognitive training using a fall prevention device (ActivLife) with a Kinect sensor. The study group consisted of 30 people aged 60 years and older who underwent a 6-week standardized training program (endurance training, general development with elements of resistance and balance / balance exercises, as well as exercises of cognitive skills - memory and visual-spatial orientation). Criteria for inclusion in the study group: - reaching the age of 60 - no contraindications to perform physical exercises in a standing position	The study concluded that a 6-week training program improved cognitive skills of seniors ($p<0.0001$), reduced BMI ($p<0.0001$), improved quality of life ($p<0.0001$) and reduced the level of depression measured by GDS test ($p<0.0001$). No effect was found on the functional efficiency ($p=0,037$), strength ($p=0,025$) and balance ($p=0,01$). The study showed that the positive influence of the trainer led to a greater number of intended physical activities, and joy caused a greater readiness to undertake activities. The induction of joy led to greater physical activity and a tendency to increase the priority of goals.

Place	Purpose of research	Description	Results
		- the possibility of using rehabilitation for one hour a week Exclusion criteria from the study group: - inability to give informed consent to participate in the study - intermediate dementia or deep dementia (measured by MMSE test). Within the study group, two subgroups are distinguished: patients with frailty syndrome - frailty (15 people) and patients without frailty or pre-frailty (15 people). Before and after the training program, patients undergo comprehensive geriatric assessment, with particular emphasis on cognitive ability and functional performance. Such parameters as weight, height, BMI, WHR index, calf and shoulder circumference are measured. Fried's criteria serve as a diagnostic tool in the direction of weakness syndrome. The functional efficiency of patients is measured using the ADL, IADL, Bartel scale and Fullerton tests, and the strength of the handshake - using a dynamometer. Risk of falls and balance are determined in the Tinetti test. The Moca test is used to measure memory and cognition. The goals and motivation of patients are examined by the KCAF test (Physical Activity Goals Questionnaire) and the quality of life by the SF-36 test. Each patient is also assessed for depression using the GDS test.	

4.3 Practice cases TP4: practice case implications of latest CU/DTU/Lyngby trials

The three studies from University of Copenhagen, all lead by R. T. Larsen and supervised by Professor Langberg, consist of a systematic review with a meta-analysis, a validation study of different physical activity monitors and a randomized controlled trial.

4.3.1 Project 1: Systematic review of the current literature

The first project investigated what effect feedback from physical activity monitoring had on older adults. The project consisted of two papers, both published.

Larsen, Rasmus Tolstrup, Jan Christensen, Carsten Bogh Juhl, Henning Boje Andersen, and Henning Langberg. 'Physical Activity Monitors to Enhance the Daily Amount of Physical Activity in Elderly—a Protocol for a Systematic Review and Meta-Analysis'. *Systematic Reviews* 7, no. 1 (2 May 2018): 69. https://doi.org/10.1186/s13643-018-0733-6.

Larsen, Rasmus Tolstrup, Jan Christensen, Carsten Bogh Juhl, Henning Boje Andersen, and Henning Langberg. 'Physical Activity Monitors to Enhance Amount of Physical Activity in Older Adults – a Systematic Review and Meta-Analysis'. *European Review of Aging and Physical Activity* 16, no. 1 (4 May 2019): 7. https://doi.org/10.1186/s11556-019-0213-6.

Abstract

- **Background**: The body of evidence related to the effect of physical activity monitor-based interventions has grown over the recent years. However, the effect of physical activity monitor-based interventions in older adults remains unclear and should be systematically reviewed.

- **Objective**: The objective of this systematic review was to estimate the effect of physical activity monitor-based interventions on physical activity behavior in participants aged 65 and above. Subsequently we explored the effect on body mass index, physical capacity, and health-related quality of life and finally the impact of patient- and intervention characteristics.

- **Methods**: Searches in MEDLINE, EMBASE, SPORTDiscus, CINAHL, and CENTRAL were performed on April 26, 2018. No publication date filters were applied. References of eligible studies were scrutinized and relevant journals were hand-searched. Randomized controlled trials and randomized cross-over trials investigating the effect of a physical activity monitor-based intervention on physical activity were included. Studies were included if the mean age of the participants was above 65 years, and participants could walk independently with or without walking aids. The Cochrane handbook was used as a template for extracting data and the RoB 2.0 tool was used to assess risk of bias. Random-effects meta-analysis using Hedges g, were used to pool the study results. The main outcome of this study was physical activity.

- **Results**: Twenty-one studies with 2783 participants were included. The median participant age in the studies was 70.5 years, the median percentage of male participants was 42%, and the median baseline daily step count was 5268. Physical activity monitor-based interventions had a moderate effect (SMD = 0.54, 95% CI: 0.34 to 0.73) compared to control interventions, corresponding to an average increase of 1297 steps per day in the intervention groups. No impact of patient and intervention characteristics on the effect estimates were found.

- **Short conclusion**: Low quality of evidence was found for a moderate effect of physical activity monitor-based interventions on physical activity compared with control interventions. More studies with higher research methodology standards are required.

- PROSPERO registration: CRD42018083648.

4.3.2 Project 2: Criterion validity of activity monitors in elderly

Few studies have investigated the measurement properties of consumer-grade physical activity monitors in older adults. Therefore, we investigated the criterion validity of consumer grade physical activity monitors in older adults and whether the measurement properties differed between older adults with and without rollators and whether worn on the hip or at the wrist.

The paper is in review in “European Journal of Aging and Physical Activity” and is available electronically here. As described, the paper is in review and should be treated as such.

Abstract

- **Background:** Few studies have investigated the measurement properties of consumer-grade physical activity monitors (PAMs) in older adults. Therefore, we investigated the criterion validity of consumer grade PAMs in older adults and whether the measurement properties differed between older adults with and without rollators and whether worn on the hip or at the wrist.

- **Methods:** Consumer-grade PAMs were eligible for inclusion in this study if they: 1) could be fastened at the hip as well as on the wrist, 2) were simple in function and design and thus easy to use for participants with minimal technical skills, 3) included step-counting as outcome measure and 4) were powered by a button cell battery. Participants performed self-paced walking for six minutes while two physiotherapists counted their steps with a click-counter. The average of the two counts was used as criterion. The participants wore 16 monitors, four located bilaterally on both hips and wrists. Our prior expectation was that all monitors would have at least moderate criterion validity for all participants, good criterion validity for participants walking without a rollator and poor criterion validity for participants walking with a rollator.

- **Results:** Four physical activity monitors were included in this study; Misfit Shine, Nokia GO, Jawbone UP Move and Garmin Vivofit 3. A total of 103 older adults participated.

- Nokia GO was excluded from this study due to technical issues. Therefore, we present results on the frequency of data loss, ICC(2,1) and percentage measurement error for Misfit Shine, Garmin Vivofit 3 and Jawbone UP Move located on four different positions.

- **Conclusions:** The hip-worn PAMs did not differ significantly in terms of measurement error or criterion validity. Wrist-worn monitors cannot adequately measure number of steps in a population of older adults using rollators. The hip-worn PAMs were superior to wrist-worn PAMs among older adults with and without rollators.

4.3.3 Project 3: Randomized controlled trial with a published protocol and a published paper with full results

This project consists of two papers, one published protocol and one published endpoint paper. The protocol is in review in “BMC Geriatrics” and listed at “clinicaltrials.gov”.
The submitted protocol is available electronically here. As described, the paper is in review and should be treated as such.

As of today, we have enrolled 65 participants. The last participants will be enrolled just before January 1, 2019. We will not be able to reach the 128 participants we need according to our sample size calculation, but we expect to have around 70 participants included in the final analysis for the paper.

Abstract

- **Background:** Physical Activity Monitors (PAMs) have been shown to effectively enhance the level of physical activity (PA) in older adults. Motivational interviewing is a person-centered model where participants are guided using self-reflection and counselling, and addresses the behavioral and psychological aspects of why people initiate health behavior changes by prompting increases in motivation and self-efficacy. Including motivational interviewing in a physical activity intervention may increase the effectivity of PAM for older adults.

- **Methods:** This motivational interviewing and physical activity monitoring trial is designed as an investigator-blinded, two arm parallel group, randomized controlled superiority trial with primary endpoint after 12 weeks of intervention. The primary outcome is PA, objectively measured as average daily number of steps throughout the intervention period. Secondary outcome measures include self-reported PA health-related quality of life, loneliness, self-efficacy for exercise, outcome expectancy for exercise, and social relations. The outcomes will be analyzed with a linear regression model investigating the between-group differences, adjusted for baseline scores. Following the intention to treat principle, multiple imputation will be performed to handle missing values.

- **Discussion:** A moderate effect on the daily physical activity from the PAMs is expected, from systematic review and meta-analyses in this superiority RCT investigating the effect of adding motivational interviewing to a PAM intervention. According to the World Health Organization, walking and cycling are key activities in regular PA and should be promoted. To increase the general public

health and lower the burden of inactivity in elderly, cost-beneficial solutions should be investigated further. If this RCT shows that motivational interviewing increases the effect of PAM with at clinically relevant effect it should be included as an add-on intervention to PAM-based programs. No matter what the results of this RCT are, the conclusions may be relevant for a clinician as the dependence on technology is increasing, especially in health promotion.

- **Trial registration:** NCT03906162 (https://clinicaltrials.gov/ct2/show/NCT03906162)

4.4 Practice case MAIA

The REACH research project laid the groundwork for MAIA (Models and Methods for an active ageing workforce: an international academy), a European research project, set within the Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE) framework.

Working populations in European Member States are ageing. In short, if most people continue to retire at around 60 years of age, the European labor force will shrink by around three million per year over the period 2020 to 2035 as reported by EU-OSHA. There is a need for a new and more comprehensive policy design to counter the shortage of workers in the future.
Moreover, in European production systems there is a growing demand of applications with arm-based robots, exoskeletons, smart and intelligent working tools, immersive virtual reality technology. All these last generation technologies if well applied have a big potential to preserve the productivity, quality and safety of the aging workforce by better powering their great level experience and extraordinary skills.

The main objective of the MAIA Academy is to create a unique research and innovation staff exchange network focused on the ageing problem in manufacturing. MAIA project will provide a multidisciplinary approach to achieve objectives as:

- The study of the aging workforce needs and requirements in European production and assembly systems;
- The development of new design methodology to create assembly and production workspaces elderly-oriented by preserving productivity, quality and safety;
- The development of new analytical models to support assembly and production line design elderly-oriented and validate them with world-wide case studies.
- Design and test of new ergonomics devices in order to support aging workers during tasks, by helping them in reducing muscular fatigue and risk of muscle skeletal disorders
- Design and test of new immersive and virtual reality instruments in order to guide elder workers and support them in the production process.

MAIA will bring together seven European partners and six third country partners to create a new generation of knowledge towards the creation of age-friendly paradigms, models and methods for manufacturing systems.

The project aims to pursue the proactive and preventative approach of REACH and to transfer it from the fields of healthcare and elderly care to a work context such as in manufacturing. TUM is one of the main partners in the project. For more information see [1].

4.5 Practice case Invis

The Poland-based startup Invis proposes to upgrade classic watches (e.g. high-quality mechanical wristwatches) with digital technology. In order to obtain functionality that is usually reserved to smartwatches or conventional activity trackers (e.g. activity monitoring, loss prevention, alarms and notifications, or NFC), Invis aims to integrate the technology discreetly into existing watch cases and straps (more information on http://www.getinvis.com/). In order to exploit the results and solutions of the REACH research projects, it is sought to integrate aspects of REACH into Invis which has the potential to open up REACH to new target audiences.

4.6 Practice cases impressions

In order to gain further insights with regard to the business strategies of REACH, we are continually engaging in dialogue (e.g. via congresses, conferences, exhibitions, etc.) with different third-party entities. In particular, this allowed us to discuss the application and use of REACH with potential users. This section provides an overview and impressions of recent activities related to the practice cases.

4.6.1 Presentation at European Geriatric Medicine Society Congress (EuGMS)

In order to facilitate the “to market” process in the final year of REACH, the consortium participated in the yearly congress of the European Geriatric Medicine Society which was attended by more than 1.500 participants. The consortium used the congress to link up with geriatric doctors and other geriatric professionals in order to be able to identify their needs and derive requirements for the REACH solutions. It was concluded from the congress, that geriatric doctors play a key role in several contexts (general practitioners, hospitals, care homes, etc.) in prescribing and recommending active ageing solutions to older persons. The key is to validate and proof the effectiveness of the solutions and head to a certain extent towards medical certification.

Figure 4-2. The 15th EuGMS in Krakow.

4.6.2 Presentation at Gerontech and Innovation Expo cum Summit (GIES)

GIES (Gerontech and Innovation Expo cum Summit (GIES), https://gies.hk/en) is an annual event held in Hong Kong. Is on the way to become one of the world's largest events for technology and innovation in technology for ageing societies. With then thousands of visitors and hundreds of projects and products shown it states a hub and gateway for innovators to the Asian care and health care market.
On invitation by the organizers of the event, REACH (http://reach2020.eu/) was asked to give insights into its approaches and in its involvement in the development of standards (amongst others its contributions to ISO TC 314 Ageing Societies, https://committee.iso.org/home/tc314).

Figure 4-3. Presentation by the scientific director of REACH2020 at GIES in Hong Kong.

4.6.3 Impressions from other activities

Other activities included displays at the REACH conference + exhibition in Lyngby, Denmark community care center in the Netherlands, or HUG in Geneva, Switzerland (see below **Figure 4-4**).

Practice case demos of TP1 in a variety of community centers and care homes in Poland and Sweden:

REACH exhibition and demo in Kopenhagen (demo hospital use case):

REACH exhibition and demo in Kopenhagen (demo home use case):

REACH practice case demo in Switzerland

Figure 4-4. Public display of the REACH solutions in various events.

5 Exemplary outlines of value chains for TP3

5.1 Overview: Design for healthy eating project proposal co-creation workshop

On the 28th of October 2019, Touchpoint 3 (TP3) team gathered together relevant stakeholders to define and co-create ingredients for the research proposals aimed at future innovation. The central ambition of this workshop was to identify the related value networks and relationships amongst different stakeholders for the common collaboration platform to stimulate innovation, research and collaboration in the context of ***design for healthy eating behavior among older adults***. The workshop consisted of two parallel sessions, each focused on a concrete, preselected context of intervention.

First context concerned the care institution where long term care is provided to chronically ill patients who, next to other diseases, often suffer from dysphagia. Malnutrition here, is a common concern accompanied with extensive care efforts required from, amongst others, professional caregivers and chefs, as well as high financial costs. Archipel represented such care institution in a present workshop – Lincy van den Edert, a team support at location Passaat en Dommelhoef in Archipel, joined the workshop.
The second case concerned the context of the heart patient's journey from hospital through rehabilitation facility to home, or to full recovery. Representative of Maxima Medical Center (MMC) – Rutger Brouwers – participated in the workshop as an expert in this context. Flow is the heart rehabilitation center at MMC. For most patients at Flow, heart rehabilitation is the next step after necessary cardiac intervention such as open-heart surgery or angioplasty. According to experts, rehabilitation starts as soon as the patient returns home after being hospitalized for 3-4 days. Food plays an extremely prominent role in influencing successful rehabilitation and speedy recovery. Experts suggest that healthy eating habits should be discussed and emphasized with patients already in the hospital (thus, 3-4 days after cardiac intervention) and maintained throughout the journey to home and beyond. Additionally, optimizing the food preparation and intake routines and processes on different timestamps during patients' journey could potentially reduce the care efforts of families and nurses, and even healthcare costs. Hubert Cornelis from Ontmoet en GroetHuys also participated in the workshop to overlook and contribute to the 'out of hospital' context (e.g., home, community) in patient's journey. Finally, we invited a representative of Philips Research – Jettie Hoonhout, from personal care and wellness development – to join the workshop in order to connect to the ongoing innovation and research opportunities at Philips in the field of health and nutrition.

The participants of the workshop for the two different contexts are listed below.

- Participants of the dysphagia patient context (Archipel):
  - BioZoon: Alxandru Rusu, Ann-Kristin Scharwze
  - TUM: Thomas Linner
  - Archipel: Lincy van den Endert
  - TU/e: Jurgen Ganzevles, Carlijn Valk, Veerle van Wijlen, Chia-Hsiu Liu

Participants of the heart patient context (MMC):
- Geneva University Hospitals (HUG): Mirana Randriambelonoro
- Ontmoet en GroetHuys: Hubert Cornelis
- Philips Research: Jettie Hoonhout

- Philips Design: Peter Lovei
- WUR: Elske Brouwer-Brolsma
- MMC: Rutger Brouwers
- TU/e: Indre Kalinauskaite, Xipei Ren, Emma Reiling, Maar Cirera Sole

The agenda of the workshop was as follows:

- 13:30-14:10 Welcome + participants introduction
- 14:10-14:30 Introduce personas/customer journey
- 14:30-14:40 Mapping current contribution if applicable and ambition of individual partner in terms of activities to the patient eating journey
- 14:40-15:00 Derive objectives and (long-term, short-term) impacts
- 15:00-15:30 Coffee break
- 15:30-16:15 Categorizing all activity input to a list of pre-defined objectives and pre-defined WPs or creating new objectives and WPs
- 16:15-16:45 Consolidating and making to do list
- 16:45-17:00 Wrap up and round of question
- 17:00 Closing the workshop

Below we provide a short summary of the workshop outcomes.

5.2 Context 1: Healthy eating of patients with dysphagia at care homes

Firstly, master students Veerle van Wijlen and Chia-Hsiu Liu presented the user journey constructed based on their earlier research in care home Archipel, Eindhoven. The participants were asked to reflect on the user journey in order to verify and enrich the current definition. The user journey covers the patient lunch experience including their activities, cognitions and emotional response from choosing the food till finishing eating at Archipel care home. The user journey map of older adults describes the collective lunch eating, in a care home from the elderly's perspective, by drawing their actions and correspondent emotional as well as cognitive reactions. The journey looks at this collective lunch experience from the perspective of a single type of elderly (persona). Namely, a mentally healthy elderly with some physical disabilities (caused by brain damage or dysphasia) who would like to gain more autonomy, wants his/her voice to be heard regarding food choice but doesn't feel so at the moment. The actions in the user journey map range from "going to the eating area" to "choosing food". Mr. X goes to the eating area in the care home, thinks it is time to eat with no particular emotional response. He approaches the assigned table (by the caretakers), feels excited and he is consciously aware that the caretakers will give him his food. He waits for the food since his food is being prepared by the caretaker, what he has in mind is when the food will come, and he feels disinterested in the process. Once the food arrives, he starts to eat, thinking that this is the same dish again. He is annoyed as he doesn't like the food which makes him feel disappointed. After he finishes eating, the caretakers start to clean the living room and that makes him conclude that eating is over and feels accomplished. He then continues to move on to the rest of his day considering what's next on the schedule and feel secure. When finishing the meal, he can start to choose the food for next week. This is done 2 or 3 times a week, but he is not so interested in it as the current process only focuses on making choices among available options but not on what he does or does not want to eat.

In the second task of the workshop, workshop participants were asked to map their success stories and challenges onto this flow (**Figure 5-1**). For example, BioZoon

listed modified food texture as their success, but modifying food beyond texture as their challenge, while Archipel listed it as a challenge the lack of abilities for residents to choose, cook their own food, and as a success – helping their clients chose the correct foods together with professionals. This exercise helped participants to discover common challenges and successes, as well as already get a grip onto where potential collaboration lies (often where the challenges and successes are different for different parties). These successful stories and challenges were further connected to a list of pre-defined objectives and impacts. New categories of objectives and impacts were created for those which were not possible to map directly.

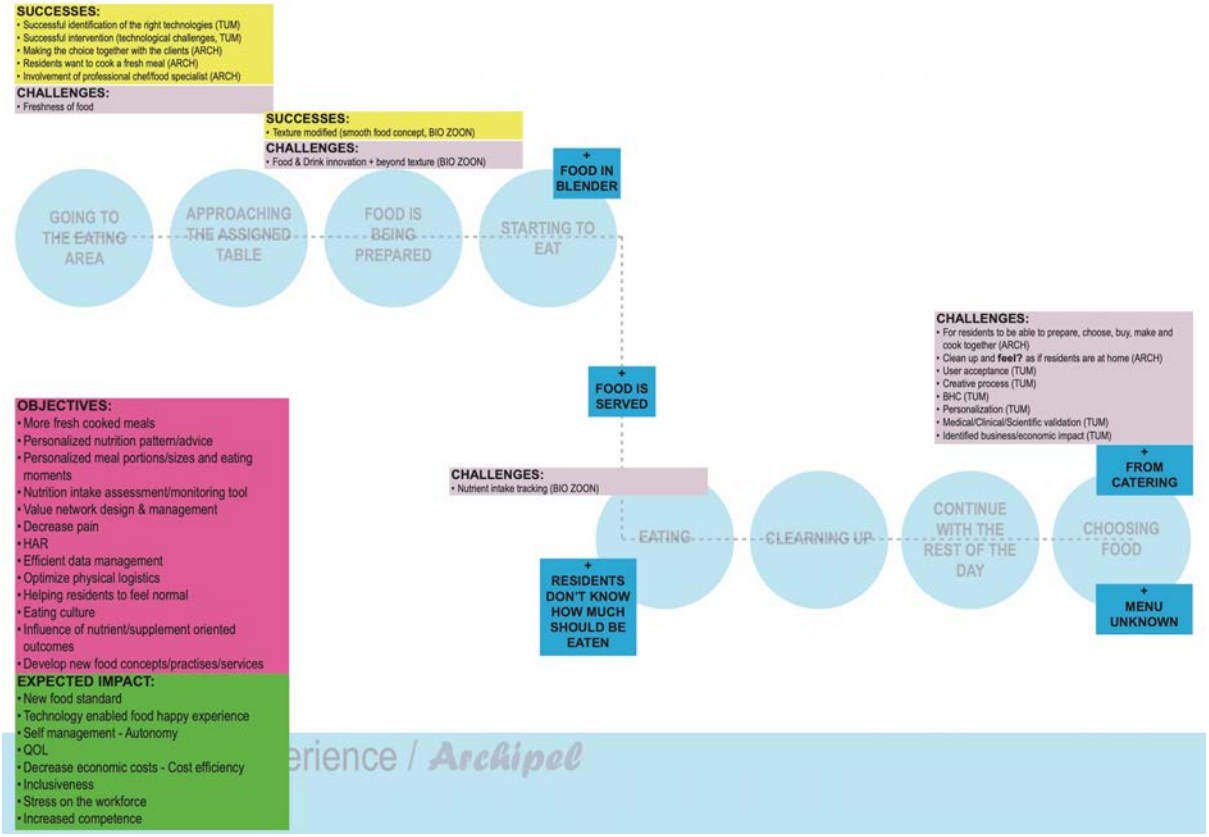


Figure 5-1. Mapping challenges and success stories onto a flow map in the context of dysphagia.

Based on these discussions, the team further applied ***logical flow mapping*** technique to re-iterate the discussion from the problems of interests to the pains of the related stakeholders (including patients and care professionals), to the opportunities and possible interventions, and eventually to the activities/WP that need to be performed in order to create the intended impacts. Digital version of logical flow map is presented below (see **Figure 5-2**).

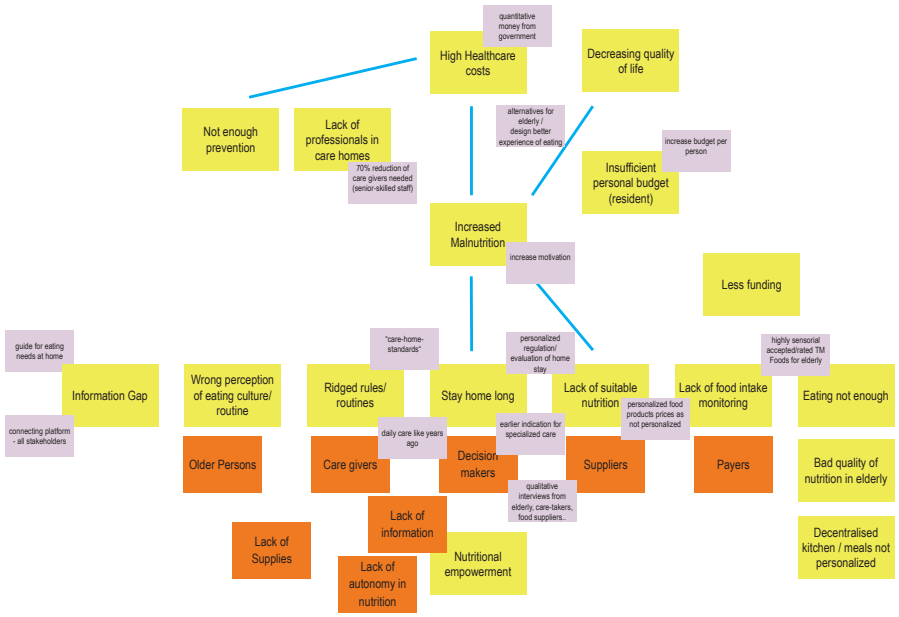


Figure 5-2. Logical flow map.

5.3 Context 2: the heart patient context

Firstly, master student Emma Reiling from TU/e presented the user journey created based on her earlier research together Rutger Brouwers at MMC. After that Indre Kalinauskaite presented the four personas she derived from Emma's research and an interview with Rutger. The participants were then asked to reflect on the personas and user journey in order to verify and enrich the current definition. The user journey covers the entire care process which starts immediately after the patients receives the intervention at the hospital, through rehabilitation till they are home again. After suffering from a cardiac event, patients receive treatments such as angioplasty after which they are hospitalized for about 4 days. During their stay, patients receive daily care from nurses and medical checkups from cardiologists. If necessary, a dietician can decide on dietary interventions. Patients are encouraged to exercise during individual- or group sessions, under supervision of a physio therapist or a movement therapist. The provided exercises can also be executed after discharge, as patients spend approximately 2 weeks at home before starting the rehabilitation process at the cardiac rehabilitation center. That process starts with an intake to assess the cardiovascular risk profile and an exercise test to measure the physical condition, resulting in a plan of approach with personal goals for rehabilitation. Depending on these goals, patients can join info sessions provided by all disciplines involved, from exercise- and relaxing programs by the physio- and movement therapist, to individual- and group sessions by the psychologist, to individual sessions by the dietician and individual sessions by the occupational therapist. The rehabilitation process takes about three months and is concluded by an evaluation and transfer of the patient to the cardiologist. **Figure 5-3** describes the activities that patients need to undertake and their interactions with different healthcare professionals including cardiologists, physiotherapists, movement therapists, dietitians, nursing specialists, sport coaches, psychologists, and occupational therapists.

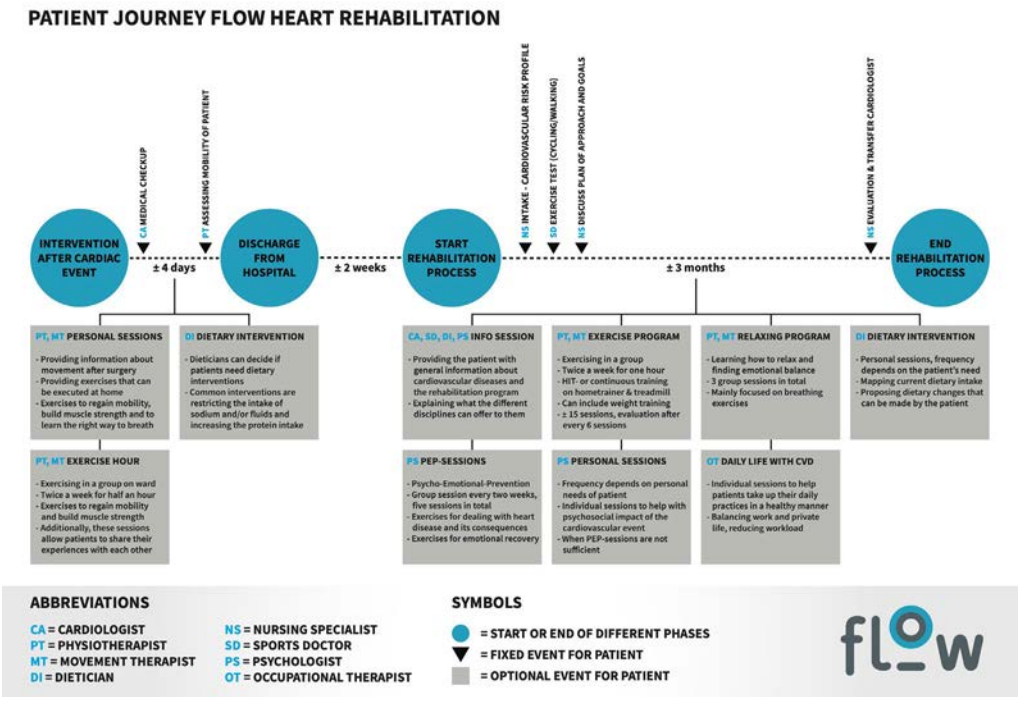


Figure 5-3. Patient journey flow – heart rehabilitation.

In the second exercise of this workshop participants were asked to map their success stories and challenge they face on the user journey (see **Figure 5-4**). For example, for MMC listed sustainable behavioral change as an overall major challenge, but they claimed success in tailoring the rehabilitation program to individual patient's needs; while Philips Research identified different strategies for behavioral change in food preparation/intake as an existing success, but measures of nutritional intake – as their challenge. This exercise helped participants to discover common challenges and successes, as well as already get a grip onto where potential collaboration lies (often where the challenges and successes are different for different parties). These successful stories and challenges were further connected to a list of pre-defined objectives and impacts. New categories of objectives and impacts were created for those which were not possible to map directly.

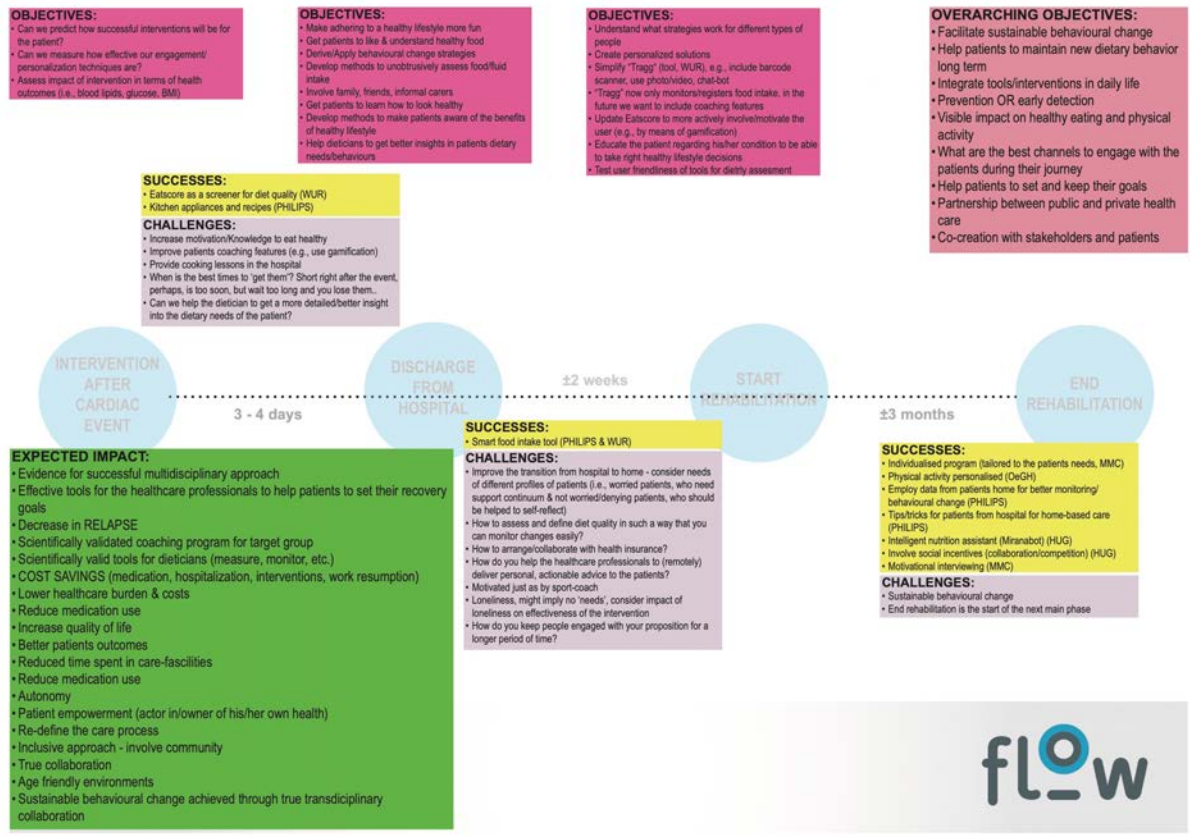


Figure 5-4. Mapping challenges and success stories onto a flow map in the context of heart disease.

Based on these discussions, the team further derived project activities that are necessary to fulfill the intended objectives and create the intended impacts. These activities were then mapped into a pre-defined list of work packages (WPs). New WP categories were created to host those activities which could not be mapped on existing list of WPs (**Figure 5-5**).

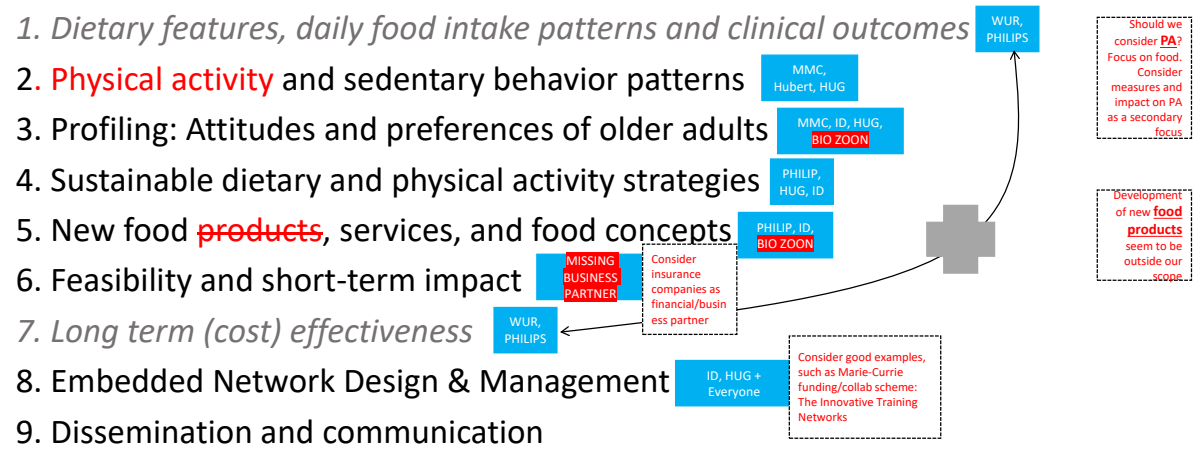


Figure 5-5. Mapping activities on work packages.

5.4 Value flow within the collaborating stakeholder network

Based on the results of the workshops and the insights collected throughout the workshop in both parallel sessions, we derived the related value networks, which are of the great importance in creating future joint innovation and research proposals. See **Figure 5-6** and **Figure** 5-7.

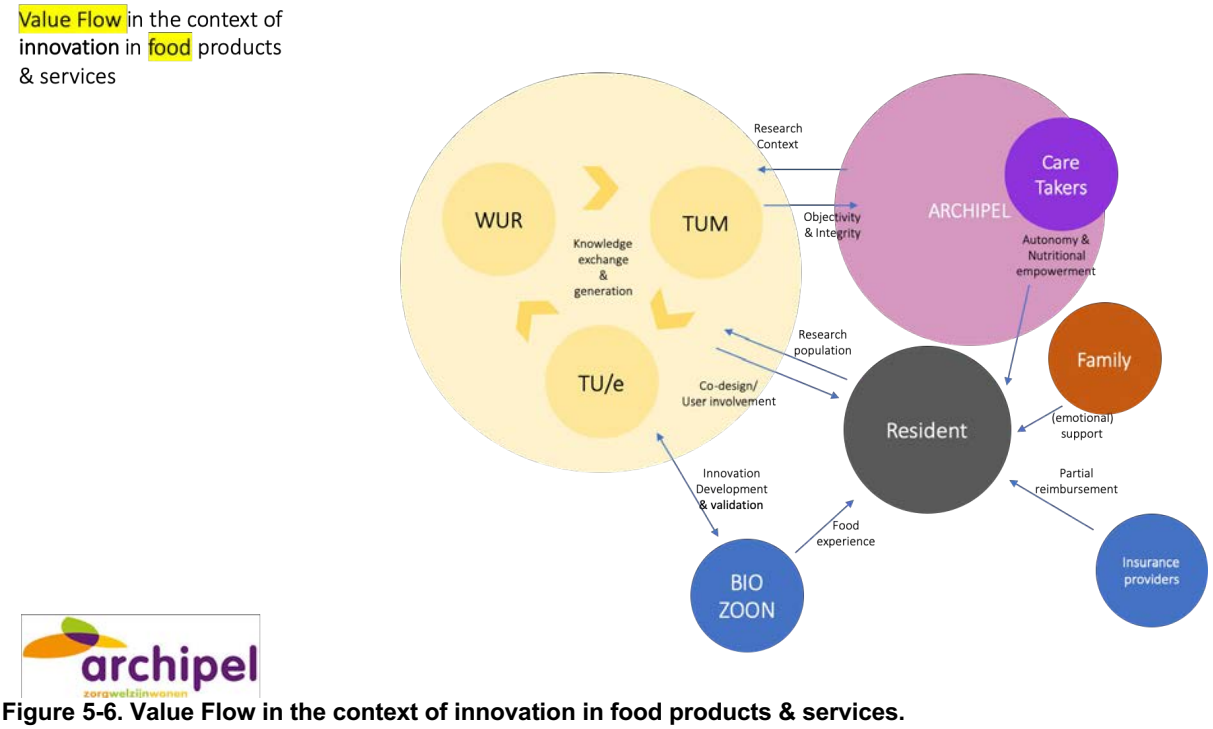


Figure 5-6. Value Flow in the context of innovation in food products & services.

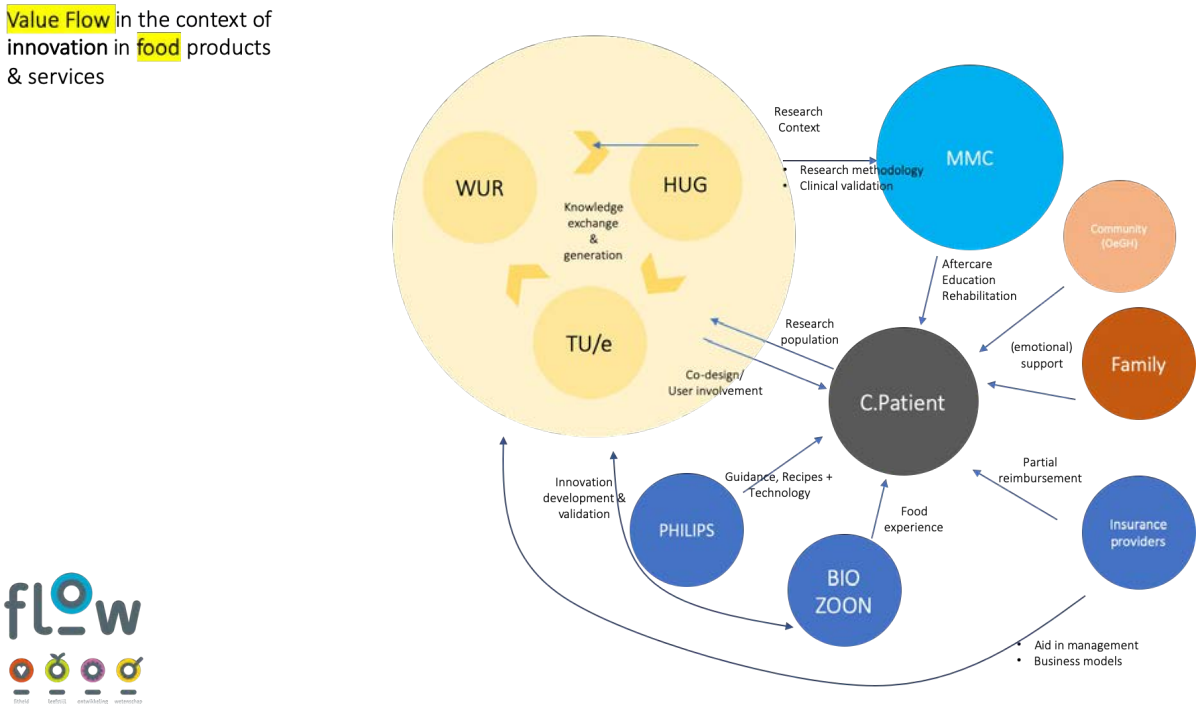


Figure 5-7. Value Flow in the context of innovation in food products & services.

The workshop results reported above will provide a common ground for the TP3 team and the value network identified to create future research innovation project proposals to move forward in the field of designing for healthy eating behaviors among older adults.

6 REACH and the ecosystems around future smart hospitals: the New North Zealand Hospital case

“Smart” features are currently being introduced in many areas. Technological advances such as digitization and automation are also impacting the healthcare sector. Smart hospitals are expected to increase the quality and efficiency of healthcare while cutting down on cost. According to consultancy firm McKinsey there are currently five trends driving the transition to smart hospitals. First, there is a shift from disease treatment to health management, which sets a bigger focus on disease prevention and rehabilitation, in order to reduce treatment. Second, there is a quest for clinical outcomes and quality, to reduce errors or unnecessary treatments. Third, there is a trend move away from the stand-alone hospital and to establish healthcare ecosystems. Moreover, patients are becoming more informed and involved in the decision-making regarding their treatment. And lastly, while healthcare costs are rising on a global scale, smart hospitals promise to deliver considerable savings (see [2]).

The REACH solution embraces these trends and offers potential value to hospitals and patients. In order to exploit the result of the project, the consortium investigated potential partners and came to an agreement with the New North Zealand Hospital and the Nordic Health Lab. The New North Zealand Hospital is a new hospital in North Zealand, Denmark and will groundbreaking new concepts in order to provide highest-quality healthcare to the region, while the Nordic Health Lab focuses on the innovation of new healthcare solutions. Based on this agreement (see **Appendix**), the partners will work together in order to identify starting points for future projects.

7 Conclusion

In this deliverable report, we focused on the exploitation of the results and solutions from the REACH2020 research project and subsequent business models, associated with **Task T8.4**. This included the steps towards the creation of a REACH consultancy firm (including business model and marketing strategy), market segmentation analysis and tools and strategies for solution finding and practice cases. We also were able to outline exemplary value chains for TP3. With the New North Zealand Hospital, we found a strong partner to move into the field of future smart hospitals. The signature of a joint agreement lays the groundwork for future projects in this direction

As a result of the tasks and activities related to **Task T8.4**, as described in this document, significant progress was made towards an exploitation and potential market introduction of the solutions and results of the REACH research project. This includes major steps towards the creation of a consultancy company, business models, value chains and marketing strategies, as well as future exchange and collaborations with third parties. As such, all objectives linked with **Task T8.4** and **Deliverable D31** have been fulfilled.

Bibliography

[1] “Models and Methods for an active ageing workforce: an international academy | MAIA Project | H2020 | CORDIS | European Commission.” [Online]. Available: https://cordis.europa.eu/project/id/873077. [Accessed: 20-Jan-2020].
[2] B. Chen, A. Baur, M. Stepniak, and J. Wang, “Finding the future of care provision: the role of smart hospitals,” *McKinsey&Company*, p. 10, 2019.

Appendix I – “To Market” Workshop Minutes

Horizon 2020
European Union Funding
for Research & Innovation

Horizon 2020: Industrial Leadership PHC-21 2015: Advancing active and healthy aging with ICT: Early risk detection and intervention

Responsive **E**ngagement of the Elderly promoting **A**ctivity and **C**ustomized **H**ealthcare

Project ID: 690425

MEETING MINUTES

Title of meeting: **REACH "to market" workshop – medical purpose, IPRs, medical certification, and business strategy & market segmentation**
Related to: all WPs
Type and location: In-person meeting at TUM
Date and times: **07/10/ - 08/10/ 2019**

Venue/location:

Technische Universität München (campus in the city center)
Arcisstrasse 21
80333 Munich
Reception for the meeting: Room Number: 4120/ Main Building/ 4th floor

Monday October 7 - medical purpose, IPRs, medical certification

09:00 – 09:30 Introduction and overview (TL): General introduction to the topics and scope of the workshop.

09:30 – 11:00 Extract and consolidate: joint definition of the medical purpose for each of the four Touchpoint and the up to 3 linked core technologies/processes as key input to the following IPR and MC sessions (group work; facilitation TL + BS);

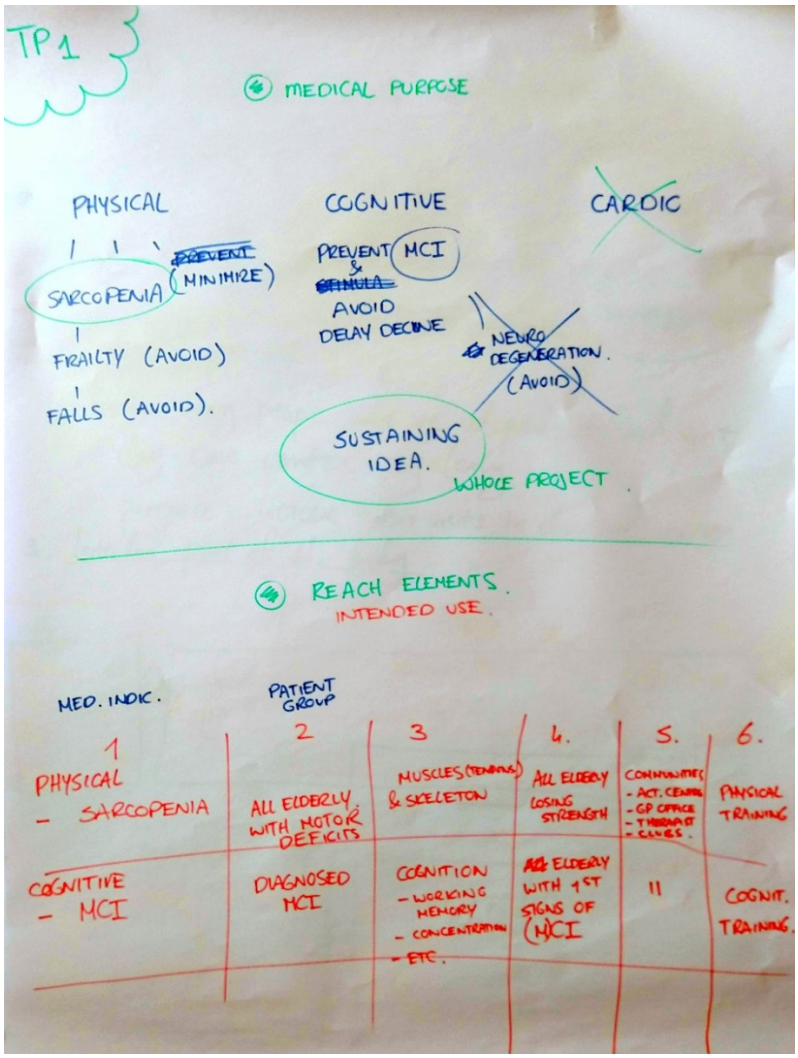
1) Introduction of REACH four Touchpoints
2) REACH project overview presentation. PPT, see in Projectplace: https://service.projectplace.com/#project/1203354283/documents/145803285/157935632
3) There is a big trend and big money in nutrition aspect
4) In recent practice, software tends to be considered a medical device if doctors make decisions based on it.
5) Presentation **of example** on Medical Use Cases Design and Validation by SmartCardia
   - Two use cases: 1) Real Time AI for Cardiac Arrhythmia Detection; 2) Sleep Apnea Detection
   - Market analysis (e.g., categories, size, market cap, etc.)
   - Use Case 1: Cardiac Arrhythmia Monitoring
     - Cardiac arrhythmia with affects over 20 million patients in US and Europe
     - Three segments: elderly or patients with symptoms; patients after surgery; patients at risk of stroke or post-stroke
     - Status quo and gaps: screening and follow-up
     - Requirements for Patch and AI to be built
     - Process of design: 1) technology development, 2) identify medical standards, 3) pre-clinical testing & clinical trial patient testing, 4) CE Class II process of FDA
     - Interface showcase of the cloud enables clinicians, patients, caretakers and family members to monitor health status in real-time
   - PPT file, see in Projectplace: https://service.projectplace.com/#project/1203354283/documents/145803285/145812881
6) Summaries of Touchpoints as the basis for the workshop: https://service.projectplace.com/pp/pp.cgi/r160685015

7) Definition of the intended purpose is key for detailing IPR and MC strategies; template for defining the medical purpose per TP: https://service.projectplace.com/pp/pp.cgi/r160717185

11:00 – 14:00 Detailing of IPRs strategy for each Touchpoint (group work; facilitation TL + LZU)

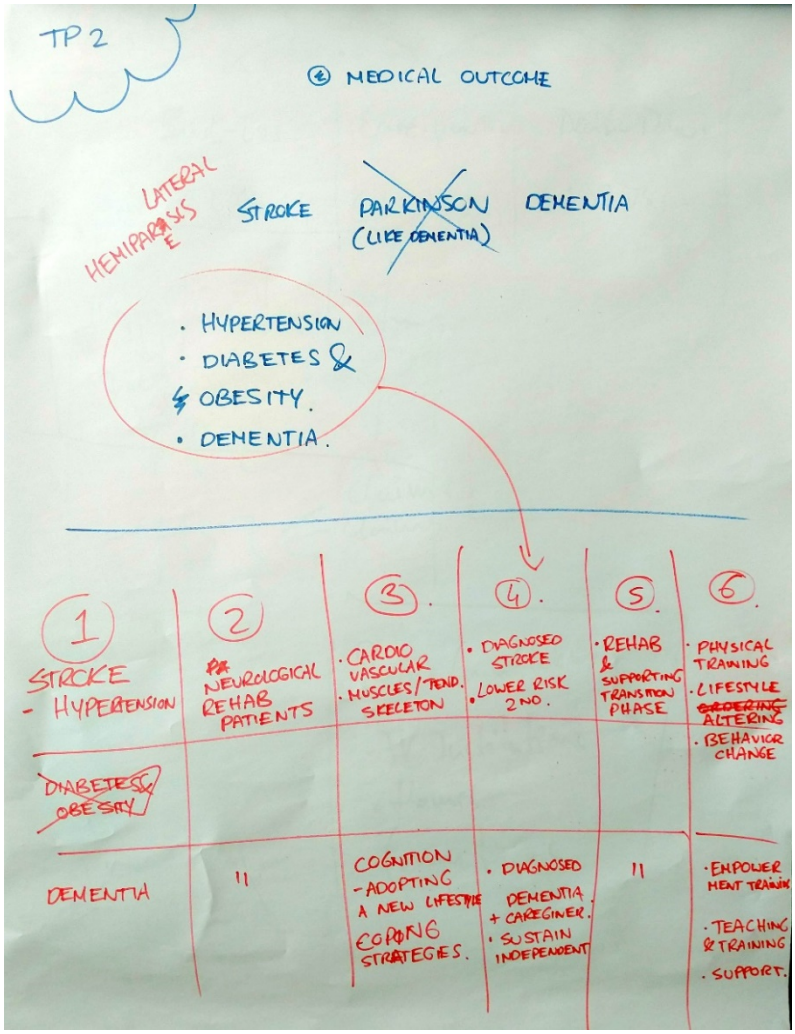
1) Reflections on the groupwork from the morning session.
2) Key three elements in each of the four Touchpoints that we need to focus on now
3) Touchpoint 1:
    - Target group: the elderly with a tendency of physical and cognitive decline who are not fully active and afraid of doing the gaming/training
    - **Modular mechanical device (multi-functional; focus on the elderly; one coach instructs two elderly with the devices)**
    - Schemes and methods are difficult to protect
    - Software and interface can be protected
    - Low-risk devices is easier to claim the equivalence
    - **Intervention schematics and processes for engagement, behavior change and physical/cognitive training/exercise**
    - **Gaming software**
    - Funny and interesting games
    - Safe feeling in gaming
    - Physical and mental training must be combined

- See poster:



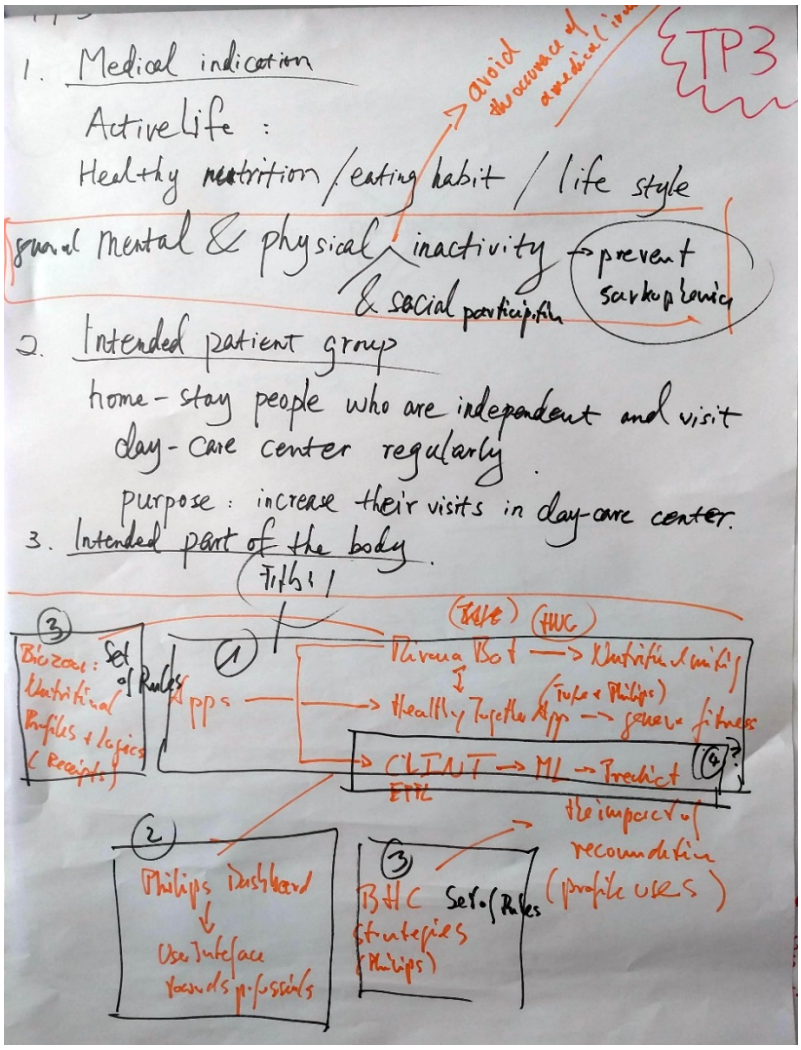
4) Touchpoint 2
   - Target group: stroke and dementia
   - Hospital will shrink in terms of size (one advantage of the REACH devices)
   - **Sensor-integrated modular mechanical devices (e.g., SilverBed, MiniArc, ActivLife&iStander) to detect vital signs, empower the patients with more autonomy, etc.**
   - **Human Activity Recognition Chain**
   - **Novel exercise and behavior change regimes in both stroke and dementia patients**
   - The goal is to assist the caregivers over the discharging time
   - Algorithms or machine learning methods at the moment are not protected

- Software is protectable in terms of copyright but not protected from being rewritten to achieve the similar functions
- SmartCardia and pressure mattress are used in the final system testing
- See poster:



5) Touchpoint 3
   - Target group: people staying at home who are still independent and visit the care centers or facilities.
   - Goal: to increase their visits and activity in day-care center
   - Various software programs are utilized (e.g., MiranaBot, CLINT, Philips Dashboard, etc.) and can be protected through copyright
   - **MiranaBot app**
   - **HealthyTogether app**

- **CLINT: data analytics/machine learning toolkit for profiling and optimized intervention assignment/design**
- See poster:



6) Touchpoint 4’s IPRs strategy can be easily established following the same method and procedure.
   - **Playware tiles, gaming software, and user interface**
   - **A variety of physical activity monitors (PAMs) + algorithms for accurate activity detection specifically for older persons**
   - **Assessment component: use of playware tiles as tool for functional assessment**
   - Treatment method and medical indication: A training guide to improve walking movement capability, gait safety, stability, endurance, and selective leg movements. The system is also able to capture parameters of gait safety (balance), walking speed, and endurance for functional assessment purposes.

15) Medical devices vs. off-the-shelf devices
16) TP1: will try to stay in Class I medical device
17) TP2: we need to discuss in detail and decide which path to choose
18) TP3: the software programs are difficult to decide whether they are medical devices
19) Summary (TL): in the next weeks, TUM will set up meetings with SKBA for further discussion about the medical certification of the REACH devices
20) PPT file, see in Projectplace: https://service.projectplace.com/#project/1203354283/documents/145803285/157914852
21) Latest version of the EU’s Medical Device Regulation (MDR): https://service.projectplace.com/pp/pp.cgi/r160676421

We will have breaks/coffee in between, and we will order some Italian food for Lunch (lunch: 12:15-13:15). Additional information and preparation requirements:

1) Reach Touchpoints overview posters;
2) REACH business strategy summary from the last review;
3) REACH IPR matrix (a technology list) and BM canvases for each TP;
4) REACH medical certification roadmap template (I produced it after our last meeting with TÜV/Dr. Akra: it shall help us to outline the medical certification roadmap for each TP; note: we have to produce a roadmap within REACH and “prepare” and not “start” actual certification).

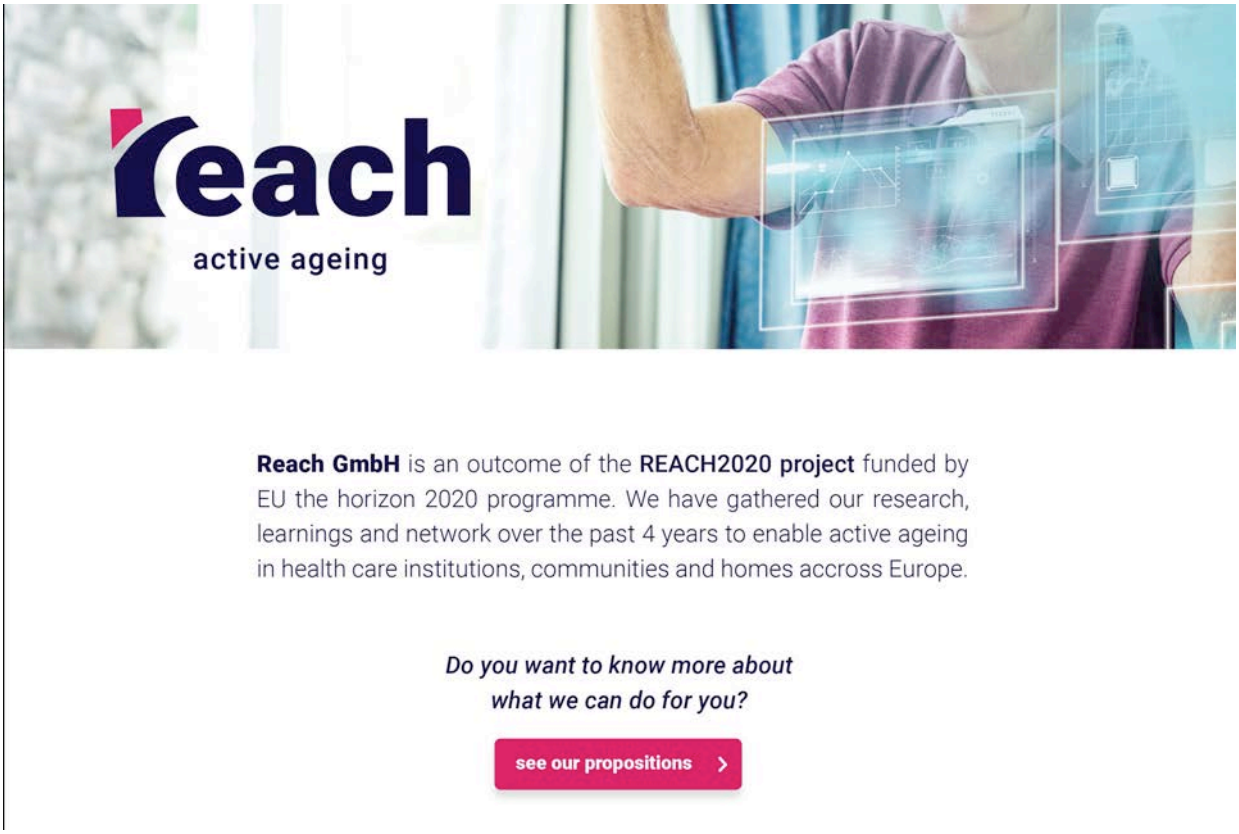
Tuesday October 8 - business strategy & market segmentation

09.00 – 09:30 Restructuring REACH for marketing and business purposes - reason why and background (presentation by TL)

09.30 – 10:00 Restructuring REACH for marketing and business purposes – strategy and first draft: what we did so far (presentation by JS)

1) REACH Consultancy (Camilla van den Boom & Jim Steenbakkers)
2) REACH statement: We are Reach. We combine cutting edge technology, knowledge and experience of our various partners to provide consultancy and solutions to promote active ageing across Europe and beyond.

3) REACH main goal: We generate solutions of ideas, concepts and products that help to keep elderly in good health. With a pro-active approach we aim to reduce pressure on ever-rising health care costs and therefore society.
4) “Technology Enabled Active Ageing”: for institutions, for homes, for communities
5) Showcasing the REACH GmbH website style presentation
6) Use cases: a) Mobility Training Equipment, b) Modular & Smart Rehabilitation Room, c) Elderly Lifestyle Application
7) Strategy & business: context, ambition, business model, process
8) Deliverables: website, interactive slide show, 3 flyers for 3 target clients, poster, better photography, translation to German / other target markets
9) PPT file, see in Projectplace: https://service.projectplace.com/#project/1203354283/documents/145807027/1910661338



10.00 – 10:30 Joint discussion and feedback (facilitators: TL + JS)

1) Political influence and aspects in REACH roadmap (e.g., providing technology to municipalities in Germany, Denmark, China, etc.)

10.30 – 11:00 Input on market segmentation strategies (Philips/ BVZ)

1) Motivational segmentation presentation by Philips Bärbel van Zanten, Hanneke Hovels, and Mili Docampo Rama

   Please note: the material provided by Philips is for consortium internal purposes only – if they are to be made public in parts for any purpose (e.g., in a public deliverable),

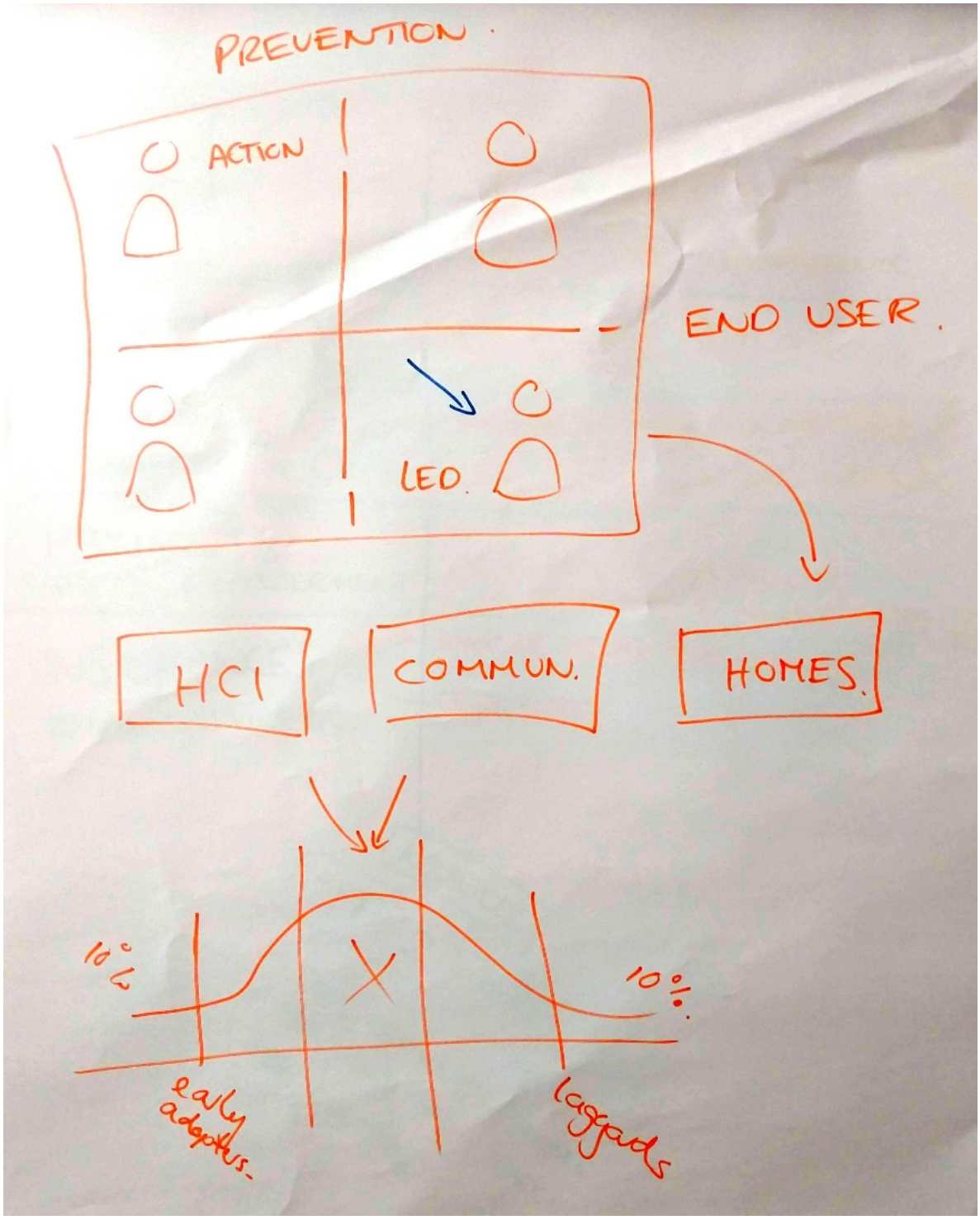
3) The goal here is to consider REACH as a whole and use Touchpoint 2 as a case study to build up the method of CBA so that other Touchpoints can also use it
4) Case study: Overview of Personalized Intelligent Interior Units in Touchpoint 2
5) Four comparison scenarios as examples
6) Limitations of the CBA
7) PPT file, see in Projectplace: https://service.projectplace.com/#project/1203354283/documents/145807027/154604190
8) Piortr:
    - Social game software cost can be more expensive for case 2 (take 11000 as consideration)
    - In the future, shortened stay time in hospital, beneficial for conventional hospital
9) Hans:
    - We need to add care home and renting service scenarios
    - How to convince the private patients to buy is an issue
    - Focus on the customers in SK to narrow down data searching and resource
    - Arjo is in a sustainable ecosystem, not covered by the insurance
10) Jim:
    - We need to consider the preventive scenario
    - Think about the big picture, not too focusing on detailed estimated numbers
11) Thomas: We should focus on fewer scenarios, but make the scenarios more reasonable

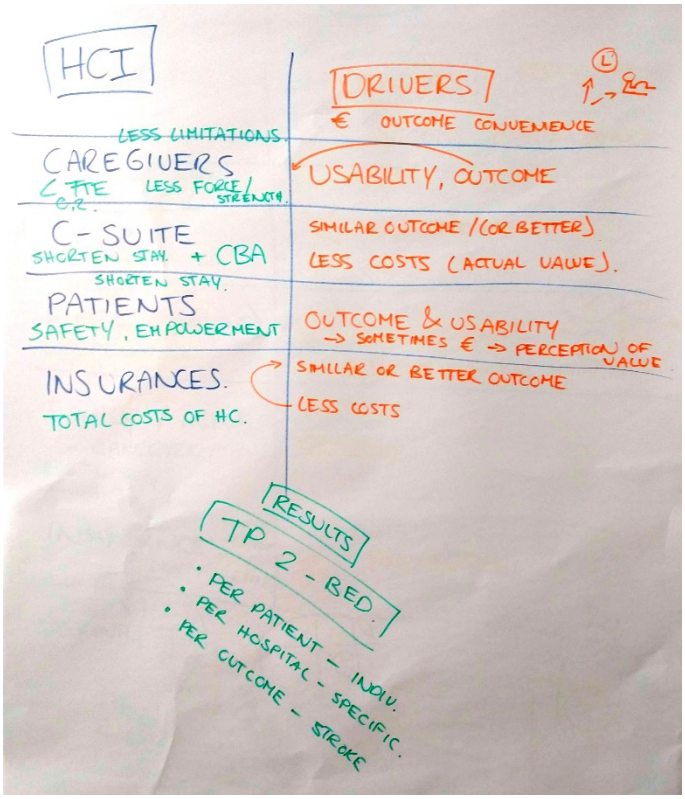
13.30 – 14:30 Lunch

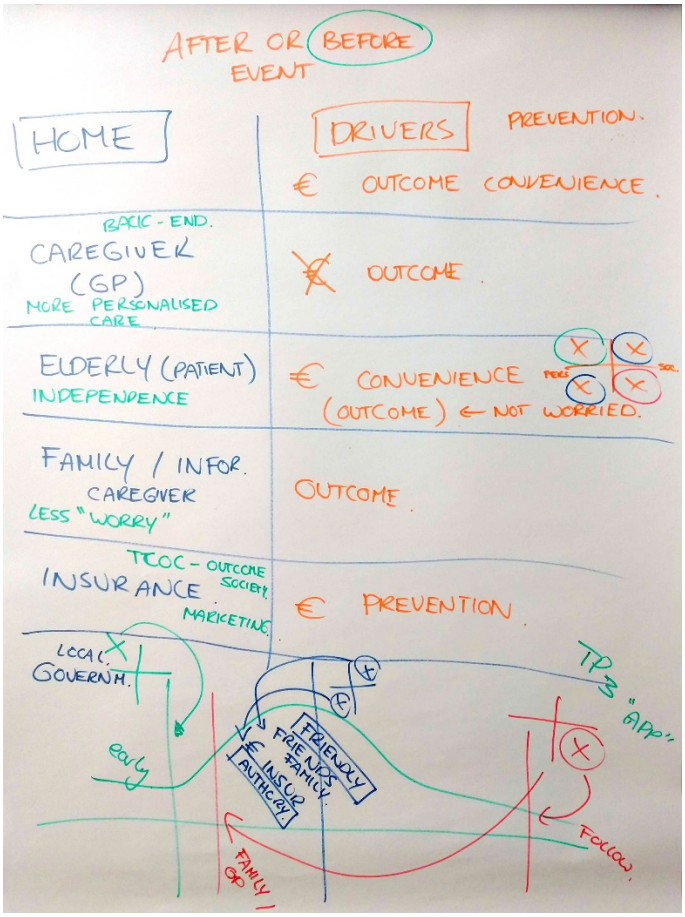
14.30 – 15:30 Split into two teams and group work for REACH business process and scenarios for CBA (presentation by TL + JS)

15.30 – 16:00 Presentations of the results from the group work (facilitators: JS + TL)

1) Storyboarding exercise for the organization, teams and processes




HCI
DRIVERS
€ OUTCOME CONVENIENCE
LESS LIMITATIONS.
CAREGIVERS
FTE LESS FORCE/STRENGTH.
USABILITY, OUTCOME
C-SUITE
SHORTEN STAY + CBA
SHORTEN STAY.
SIMILAR OUTCOME (OR BETTER)
LESS COSTS (ACTUAL VALUE).
PATIENTS
SAFETY, EMPOWERMENT
OUTCOME & USABILITY
-> SOMETIMES € -> PERCEPTION OF VALUE
INSURANCES.
TOTAL COSTS OF H.C.
SIMILAR OR BETTER OUTCOME
LESS COSTS
RESULTS
TP 2 - BED.
• PER PATIENT - INDIV.
• PER HOSPITAL - SPECIFIC.
• PER OUTCOME - STROKE


AFTER OR BEFORE EVENT
HOME
DRIVERS
PREVENTION.
€ OUTCOME CONVENIENCE.
BACK-END.
CAREGIVER (GP)
MORE PERSONALISED CARE
OUTCOME.
ELDERLY (PATIENT)
INDEPENDENCE
€ CONVENIENCE (OUTCOME) ← NOT WORRIED.
FAMILY / INFOR. CAREGIVER
LESS "WORRY"
OUTCOME.
TCOC - OUTCOME SOCIETY
INSURANCE
MARKETING
€ PREVENTION.
LOCAL GOVERNM.
TP3 "APP"
early
FRIENDLY FRIENDS FAMILY.
INSUR AUTHORITY
FAMILY GP
FOLLOW.

2) Guideline scenarios for CBA co-created by the group work:

Categories	Scenario 1	Scenario 2	Scenario 3
Name	Prevention	Rehabilitation hospital + follow-up + readmission	Care home (quality of life)
For whom	Communities (e.g., city, municipality, etc.)	Decision makers (CEOs, heads of hospitals), caregivers	Caregivers, decision makers (heads of care homes)
Medical claim	• Healthy aging (fall-prevention, social/physical activity, ADLs, etc.)	• Lower hospital cost • Shortened hospital stays • Better patient experience	• Higher satisfaction • Higher quality of life
Environment	• Independent life at home • Community / village	• Rehabilitation hospital + home	• Care home (20-100 users/units)
Time (application/ investment)	• 25-30 years (after retirement) • 5-7 years	• 3 weeks + 3 months • 5-7 years	• 2 years (average stay period at care home) • 5-7 years
Product level	Non-medical level	Medical level device	Non-medical level or non-risk class
Grant	++	++	+

16.00 – 16:30 Closing remarks - next work steps in the context of the “medical certification roadmap” task (TL)

1) Update of the Touchpoint outlines/summaries with the information produced on the workshop: in particular, the definition of the medical purposes and medical claims for each TP and the selected 3 core sub-systems for each TP (we will do that as part of the summary Rongbo is producing currently) – **task leader: TUM**
2) Revision and refinement of a) medical claims plus b) the with these claims associated necessary (in the future, beyond REACH) verification/validation procedures towards medical certification; both on overall TP level and for each of the 3 selected key sub-systems per TP – **task leader: TUM + SK** (@Barbara: please make an appointment with Dr. Müller, TL will prepare things in a table form, and then we go through it with him one by one – ideally we would have this meeting before October 24).
3) Risk analysis (key to plan the clinical evaluation and certification roadmap) – Prof. Andersen, Tu/e, and I have still to complete a risk analysis deliverable in WP8. I will re-interpret and

use this deliverable together with them so that we do the risk analysis in parts in the context of points 1. and 2. – **task leader: DTU + Tu/e + TUM** (TL will do this with them in parallel until December).

4) Identification and analysis of standards (ISO, IEC, etc.) that need to me met in the context of each claim/sub-system. Standards search and identification – task leader: DTU + TUM (I will do this with him in parallel until December) – **task leader: SC** (Francisco and Srini, since they have experience on this; needs to be done in November/December based on steps 1. and 2. completed)
5) Final positioning – medical claim + assignment to medical device class. Weill be done jointly by this work group. I will arrange a Skype meeting for this in January in the run-sup to the consortium meeting. – **task leader: TUM + All**
6) CBAs for 3 positioning scenarios: Apart from that, an important task is that we do the CBAs for the 3 major scenarios that we have fined on day 2 (i.e. in the table that Piotr and I produced in the work session in the afternoon) – **task leader TUM + All** (Rongbo and Charlie will complete this as soon as possible)

16.30 - End of the day

Appendix II – Business model and marketing strategy presentations

Reach

active ageing

We are Reach. We combine cutting edge technology, knowledge and experience of our various partners to provide consultancy and solutions to promote active ageing accross Europe and beyond.

Reach

active ageing

Reach

> reach.eu

our network

PHILIPS

Technical University of Munich

ALREH MEDICAL

arjo

DIN

Fraunhofer IAIS

Reach

active ageing

Reach GmbH is an outcome of the **REACH2020 project** funded by EU the horizon 2020 programme. We have gathered our research, learnings and network over the past 4 years to enable active ageing in health care institutions, communities and homes accross Europe.

Do you want to know more about what we can do for you?

see our propositions ›

For institutions

Hospitals / rehabilitation clinics / care homes

Case study:
Gamified rehabilitation

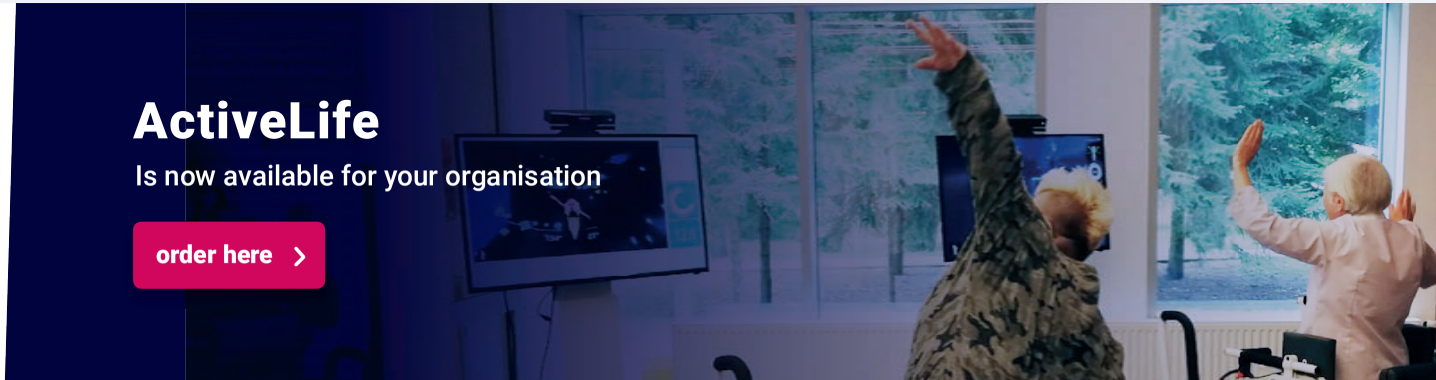
ActiveLife is a fully operational rehabilitation set up featuring a state of the art game. Like this patients can rehabilitate in a safe and fun environment.

Reach helped to develop and test ActiveLife in various markets and use cases, and push this product towards medical approval.

learn more about this project ›

How Reach helped:

- medical approval
- development & testing
- network access



For homes

Home / home care

Case study:
Spoken diet

Reach has developed MiranaBot together with Geneva Hospital. It is a digital tool to help elderly gain consciousness about their food intake.

learn more about this project ›

For communities

Municipalities / regions / care facilities

Case study:

Data enabled active ageing

In an activity center called 'Ontmoet & Groet' in the Netherlands, Reach has been able to install a health and active ageing program. Through motivational strategies, and monitoring of health, the average guest of this facility has become statistically more healthy than the mean.

learn more about this project ›

How Reach helped:

- data sourcing
- motivational strategies
- fitness tests for elderly

Our experts on this project:

Hubert Cornelis
Elderly practice

Jim Steenbakkers
CMO

Appendix III – Visual report of the co-creating proposal workshop

Visual Report of the Co-creating Proposal Workshop

Design for Healthy Eating Behavior of Older Adults

Lu Yuan, Indre kalinauskaite, Industrial Design

TU/e Technische Universiteit Eindhoven University of Technology

REACH 2020

WORKSHOP BY

Lu Yuan, Indre kalinauskaite, Jurgen Ganzevles

AGENDA

- 13:30-14:10 Welcome + participants introduction
- 14:10-14:30 Introduce personas/customer journey
- 14:30-14:40 Mapping current contribution if applicable and ambition of individual partner in terms of activities to the patient eating journey
- 14:40-15:00 Derive objectives and (long-term, short-term) impacts
- 15:00-15:30 Coffee break

AGENDA

- 15:30-16:15 Categorizing all activity input to a list of pre-defined objectives and pre-defined WPs or creating new objectives and WPs
- 16:15-16:45 Consolidating and making to do list
- 16:45-17:00 Rap up and round question
- 17:00 Closing workshop

INTRODUCTION

Are we ready?

CO-CREATING PROJECT PROPOSAL

Two contexts

Promoting healthy eating behavior

Cardiac Rehabilitation for older heart patients from hospital to home

- Geneva University Hospitals (HUG): Mirana Randriambelonoro
- Ontoet en GroetHuys: Hubert Cornelis
- Philips Research: Jettie Hoonhout
- Philips Design: Peter Lovei
- WUR: Elske Brouwer-Brolsma
- MMC: Rutger Brouwers
- TU/e: Indre kalinauskaite, Xipei Ren, Emma Reiling

Appendix IV – Respond to Rs – Serum albumin as nutrition marker and control of nutritional intake

Definitions

- **Malnutrition**

Previous research has shown associations between malnutrition and a decreased muscle and immune function, impaired quality of life, decreased wound healing and reduced functional status. However, there is a lack of a uniform definition of malnutrition [1]. **The European Society for Clinical Nutrition and Metabolism (ESPEN) has recently put forward a consensus definition for malnutrition with the aim to reach uniformity between countries and between studies** [2]**:**

- ESPEN diagnostic criteria for malnutrition [3] - The consensus statement proposed by an international expert group was formulated to 'provide a consensus-based minimum set of criteria for the diagnosis of malnutrition independent of clinical setting and etiology, and to unify international terminology'.
  The set of criteria includes not only weight loss and BMI, but also fat free mass index (FFMI). The ESPEN diagnostic criteria for malnutrition consist of three subgroups. The first subgroup includes all patients with a BMI lower than 18.5 kg/m^2. The second subgroup includes all patients with weight loss of more than 10% (indefinite of time) or more than 5% over the last three months and a BMI<20 kg/m2or<22 kg/m^2 in patients under or above the age of 70, respectively. The third subgroup includes all patients with weight loss of more than 10% (indefinite of time) or more than 5% over the last three months and a FFMI of<15 kg/m^2 and<17 kg/m^2 in females and males, respectively.

Fact box: Two alternative ways to diagnose malnutrition. Before diagnosis of malnutrition is considered it is mandatory to fulfil criteria for being "at risk" of malnutrition by any validated risk screening tool.

Alternative 1:

- BMI <18.5 kg/m^2

Alternative 2:

- Weight loss (unintentional) > 10% indefinite of time, or >5% over the last 3 months combined with either
- BMI <20 kg/m^2 if <70 years of age, or <22 kg/m^2 if ≥70 years of age or
- FFMI <15 and 17 kg/m^2 in women and men, respectively.

- **Serum Albumin**

Albumin is the most abundant protein in human serum. Serum albumin concentrations decrease with increasing age by approx. by 0.1 g/L per year; however, age itself is not a cause of distinct hypoalbuminemia.

There is a clear relationship between serum albumin concentrations and all-cause mortality in elderly subjects [4]. In patients with a hip fracture, albumin levels below 35 g/L were associated with higher rates of post-operative complications such as sepsis and higher overall mortality. Inflammatory states and in particular, high concentrations of the cytokines IL-6 and TNF-alpha, were two of the main factors causing low levels of serum albumin [5]. Systemic inflammation not only reduces albumin synthesis but increases its degradation and promotes its transcapillary leakage.

Other studies also found this protein to be a good predictor of surgical outcome [6, 7]. Compared to nine other risk variables, serum albumin was the strongest predictor. These findings were confirmed in a later study [6], but whether hypoalbuminemia was due to undernutrition or advanced disease was not clarified in these trials.

Albumin has been criticized as a player in nutritional assessment due to its lack of specificity and long half-life (approximately 20 days) [8]. Serum albumin concentrations not only decrease during decreased synthesis due to inflammatory cytokines as mentioned above or to hepatic insufficiency, they may also decrease following renal losses in nephrotic syndrome and to losses via the GI tract in protein-losing enteropathies [9].

- **Serum Prealbumin**

Prealbumin, also named transthyretin, is a transport protein for thyroid hormone and is synthesized by the liver and partly catabolized by the kidneys. Serum prealbumin concentrations less than 10 mg/dL are associated with malnutrition [10].

The use of prealbumin has been advocated as a nutritional marker, particularly during refeeding and in the elderly [11]. The main advantage of prealbumin compared to albumin is its shorter half-life (two to three days) (Table 1), making it a more favorable marker of acute changes of the nutritional state. In addition, prealbumin was not influenced by intestinal protein losses in patients with protein-losing enteropathy [12].

Prealbumin levels may be increased in the setting of renal dysfunction, corticosteroid therapy or dehydration, whereas they can be decreased during physiological stress, infection, liver dysfunction, and over-hydration [13].

An algorithm that uses prealbumin has recently been proposed as a practical guide to help the clinician to stratify general medical and intensive care patients by risk of complications and outcome [13]. Prealbumin screening should only performed when an acute inflammatory state (CRP > 15 mg/L) was excluded. A prealbumin level of < 0.11 g/L was associated with increased mortality and length of stay, and an increase by less than 0.04 g/L per week indicated failure of nutritional therapy.

An increase in the C-reactive protein/prealbumin ratio in medical intensive care unit patients has been associated with mortality [14], and a low C-reactive protein/prealbumin ratio in surgical patients predicted the successful closure of gastrointestinal fistulas [36]. Routine measurement of prealbumin has been advocated to be a useful nutritional and prognostic indicator in non-ICU patients without inflammation [13].

Several publications reported a role for prealbumin in predicting prognosis (mostly survival) in various clinical conditions such as gastric cancer [15], lung cancer [16] and cardiovascular diseases [17].

Table 1 Characteristics of serum visceral proteins used as nutritional markers.

Protein	Molecular Weight	Half-Life	Reference Range
Albumin	65,000	20 days	3.30 to 4.80 g per dL
Transferrin	76,000	10 days	0.16 to 0.36 g per dL
Prealbumin	54,980	2 days	16 to 35 mg per dL
Retinol-binding protein	21,000	1/2 day	3–6 mg/dL

Table adapted from Spiekerman AM [18].

Serum Albumin as Nutrition marker and control of nutritional intake

Summary of literature research

2009- Evidence that albumin is not a suitable marker of body composition-related nutritional status in elderly patients (Bouillanne O., et al)

- Serum albumin is not a suitable marker of body composition-related nutritional status in elderly patients.
- BMI is a simple and useful marker of nutritional status that is highly correlated to LM, ASMM, and BCM indexes in hospitalized elderly patients. **Conversely,** hypoalbuminemia is associated with an increased nutrition-related risk of morbidity and mortality; therefore, serum albumin concentration could usefully identify patients at high risk of morbidity and mortality

2010 – Reassessment of Albumin as a Nutritional Marker in Kidney (Disease Allon N. et al)

- Serum albumin is an unreliable marker of nutritional status.
- Nutritional supplementation has not been clearly shown to raise levels of serum albumin.
- Anorexia nervosa offers a useful model through which to understand the relationship between malnutrition and serum albumin because patients with anorexia experience loss of lean and fat mass independent of manifestations of illness such as volume shifts, altered vascular permeability, or abnormal albumin loss [1]. These patients maintain serum albumin levels in the normal range, even when BMIs reach the low teens.33–36 Only when health status approaches death does serum albumin actually fall [2].
- Although the assumption that hypoalbuminemia reflects a state of malnutrition is often accompanied by the corollary that nutritional interventions can raise serum albumin levels, the supportive evidence for this is inconsistent.
- Although the early rise in serum albumin may be construed as resulting from the nutritional intervention, a plausible alternative explanation involves the introduction of bias through the study's unblinded design that led to extra nutritional interventions that reduced inflammation. In fact, study subjects' baseline characteristics more strongly suggest the presence of systemic inflammation rather than malnutrition, and early albumin changes were negatively correlated with changes in C-reactive protein. Therefore, **on the basis of the available literature, there is insufficient evidence to conclude that nutritional supplementation raises serum albumin**.

2015– Serum Albumin and Prealbumin in Calorically Restricted, Non-diseased Individuals: A Systematic Review (Lee J.L. et all))

- In otherwise healthy subjects, serum albumin levels remained normal despite marked nutrient deprivation **until the extremes of starvation,** that is, body mass index <12 or more than 6 weeks of starvation.
  In these otherwise healthy subjects, serum albumin levels are not "markers of nutritional status." The "markers" failed to identify subjects with severe protein-calorie malnutrition until extreme starvation. That is, they failed to identify healthy individuals who would benefit from nutrition support, becoming abnormal only when starvation was already obvious.

- Serum albumin levels are known to fall promptly with injury or illness regardless of nutrient intake. They are negative acute-phase reactants. When these measures are low in sick patients, this cannot be assumed to reflect nutritional deprivation.
- Decisions about nutrition support should be based on evidence of meaningful benefit from this treatment rather than on assessment of "nutritional markers."

2015– Serum albumin and health in older people: Review and meta-analysis (Cabrerizo S., et al)

- Albumin is a good marker of nutritional status in clinically stable people.
- One of the main roles assigned to albumin is as an indicator of malnutrition.
- There **are many factors**, in addition to nutrition, that influence levels of albumin in plasma.
- Inflammatory state and, particularly, high concentrations of IL-6 and TNF-alpha, are two of the main influencing factors of hypoalbuminemia.

2016- Malnutrition: laboratory markers vs nutritional assessment (Shishira B., et al)

- Although historically popular, **studies are inconsistent** for proving the validity of serum markers as determinants of patients' nutritional status.
- The major consensus in the literature is that these laboratory markers are not reliable by themselves.
  They are popular because they offer objective and quantitative results; however, they should only be used as a complement to findings from a thorough physical examination.
- Serum proteins such as albumin are good **for detecting inflammatory states rather than malnutrition**; the distinction between the two is important for clinicians to understand.
- Physical examination is a better tool for diagnosing malnutrition.
- Newer techniques such as BIA are being investigated for their usefulness in determining nutritional status; they also have the advantage of being noninvasive and relatively cost-effective, which allows for simple bedside determination of a patient's muscle mass. However, it is still uncertain if these techniques are superior to physical examination.

2017 – Is transthyretin (prealbumin) a good marker of nutritional status? (Delliere S., et al)

- Albumin is impractical for assessment of acute changes in nutritional status because of its long half-life but should perform better as an index of chronic malnutrition**.**

2019– Nutritional Laboratory Markers in Malnutrition (Keller, U., et al)

- The current consensus is that laboratory markers could be used as a complement to a thorough physical examination.
- **Prealbumin** is nowadays often preferred over albumin due to its shorter half live, reflecting more rapid changes of the nutritional state.
- Recent focus has been on an **appropriate nutrition-focused physical examination** and on the patient's history for diagnosing malnutrition, and the role of inflammation as a risk factor for malnutrition has been more and more recognized. Inflammatory signals are potent inhibitors of visceral protein synthesis, and the use of these proteins as biomarkers of the nutritional status has been debated since they are strongly influenced by inflammation and less so by protein energy stores.

- Other markers of the nutritional status such as urinary creatinine or 3-methylhistidine as indicators of muscle protein breakdown have not found widespread use. Serum IGF-1 is less influenced by inflammation and falls during malnutrition. However, its concentration changes are not sufficiently specific to be useful clinically as a marker of malnutrition, and serum IGF-1 has less been used in clinical trials.

Table 2 Anthropometric parameters and biomarkers in various nutritional assessment and screening tools (adapted from [3] **with an update, in chronological order of publication.**

Nutritional Assessment and Screening Tool	Anthropometric Parameters and History	Biomarkers
Prognostic Nutritional Index [4]	Triceps skin fold	Albumin, transferrin, skin sensitivity
Prognostic Inflammatory and Nutritional Index [5]	None	Albumin, prealbumin, C-reactive protein, _1-acid glycoprotein
Subjective Global Assessment (SGA) [6]	Weight history, diet history, primary diagnosis, stress level, physical symptoms (s.c. fat, muscle wasting, edema), functional capacity, gastrointestinal symptoms	None
Birmingham Nutrition Risk Score [7]	Weight loss, BMI, appetite, ability to eat, stress factor, (severity of diagnosis)	None
Nutrition Risk Classification [8]	Weight loss, percentage ideal body weight, dietary intake, gastrointestinal function	None
Mini Nutritional Assessment (MNA; [9]	Weight data, height, mid-arm circumference, calf circumference, diet history, appetite, feeding mode	Albumin, prealbumin, cholesterol, lymphocyte count
Malnutrition Screening Tool [10]	Appetite, unintentional weight loss	None
Simple Screening Tool [11]	Body mass index (BMI), percentage weight loss	Albumin
Full nutritional assessment [12]	BMI, information on unintended weight loss, triceps skinfold thickness, mid-arm muscle circumference	Serum albumin, prealbumin, and total lymphocyte count
Malnutrition Universal Screening Tool (MUST) [13]	BMI, change in weight, presence of acute disease	None
Nutritional Risk Screening (NRS) 2002 [14]	Weight loss, BMI, food intake, diagnosis (severity)	None
Short Nutrition Assessment Questionnaire [15]	Recent weight history, appetite, use of oral supplement or tube feeding	None
Controlling nutritional status (CONUT) [16]	None	Serum albumin, total cholesterol and total lymphocyte count
Maastricht Index [17]	Percentage ideal body weight	Albumin, prealbumin, lymphocyte count
Nutritional Risk Index [18]	Present and usual body weight	Albumin
Elderly Nutritional Indicators for Geriatric Malnutrition Assessment (ENIGMA) [19]	Nutritional history	Albumin, hemoglobin, total cholesterol and lymphocyte count

About half of all published risk scores of malnutrition use serum laboratory markers such as visceral proteins (Table 2). Results of these screening tests vary considerably. Among ancillary parameters, serum visceral proteins were mentioned, but since they would rather reflect the state of inflammation it was proposed to use them with caution to diagnose malnutrition.

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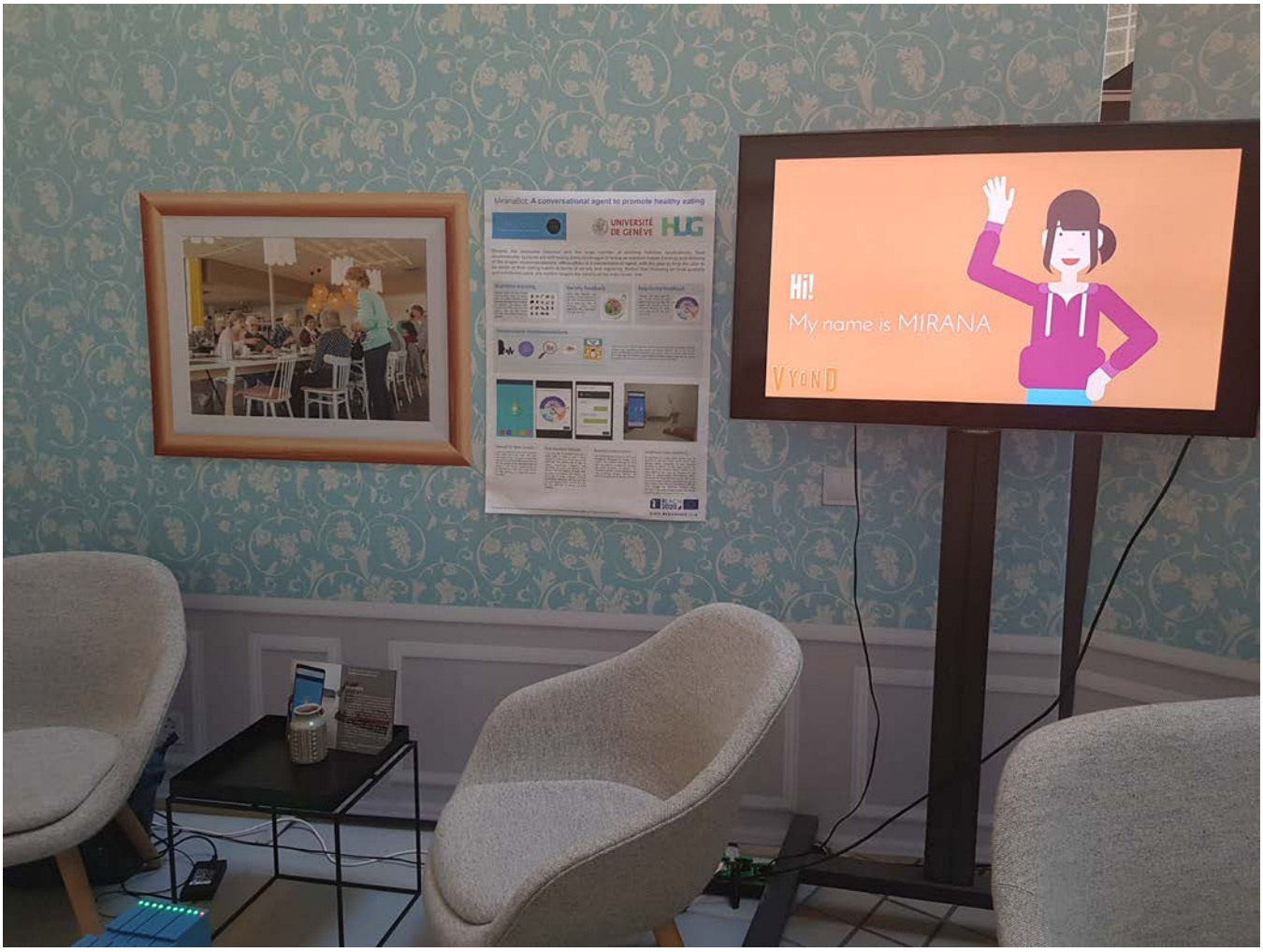
Mirana Bot: A conversational agent to promote healthy eating
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HUG
Hi!
My name is MIRANA
VYOND


WiR
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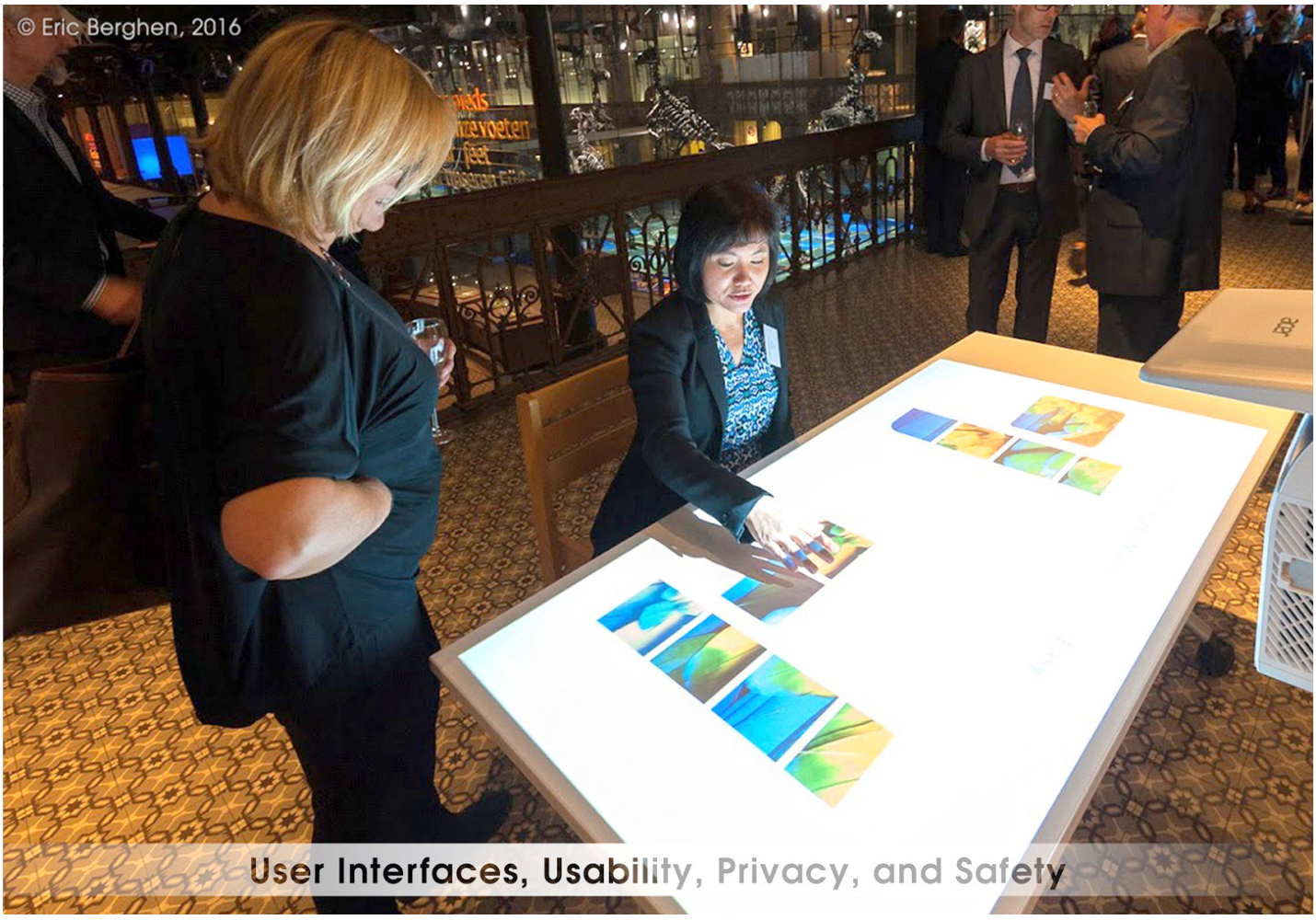
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User Interfaces, Usability, Privacy, and Safety


Motivation and Physical Activity

Appendix V – Practice cases impressions

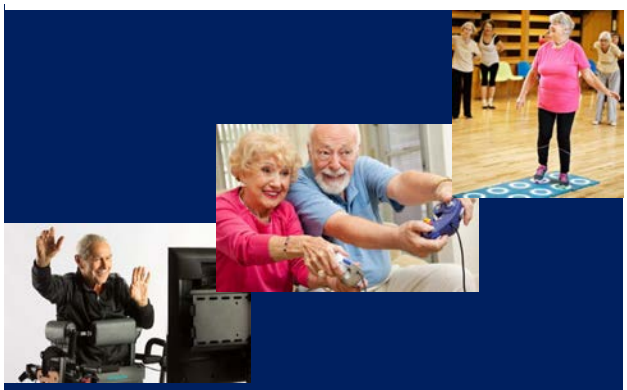
CONFERENCE ON ACTIVE AND HEALTHY AGEING 2019

14-16 May, 2019

Technical University of Denmark

Copenhagen / Kgs. Lyngby, Denmark

BOOK OF ABSTRACTS



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Conference on Active and healthy Ageing 2019
Programme and Book of Abstracts
Editors: Humira Ehrari, Henning Boje Andersen
Revised version

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Healthcare Management Group
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Kongens Lyngby Denmark
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Tuesday 14 May	
12:00-12:30	Conference busses from Copenhagen Airport direct to venue (approx. 40 minutes. See 'Airport Bus' at website)
12:30-13:15	Registration/name badges. Light lunch: sandwiches, refreshments
	Opening address
13:10-13:50	Dr. Malcolm Fisk, Ethical Imperatives around Product and Service Standards for Assistive Technologies
13:50-14:30	Dr.Maddalena Ilario, The European Blueprint for the digital transformation of health and care in an ageing society
14:30-15:00	Prof.M. Vollenbroek-Hutten, E-Supporter: Personalized technology supported coaching of people with type 2 diabetes mellitus
15:00-15:30	Coffee break/ refreshments
15:30-16:00	Dr.Veronica Zavagli, Care for carers: an investigation on family caregivers' needs, tasks, and experiences.
16:00-16:30	Giuseppe Liotta, Social interventions to limit the mortality increase during the summer 2017 heat waves in Rome – Italy (not presented, replaced by prof. Anja Maier: From crowd-sourced)
16:30-17:00	Prof. C. Holland, Integrated Housing, Care and Support: Outcomes on frailty, psychological health and mobility
17:15-18:15	Separate meetings for members (AHA; Gerontechnology)
18:30-20:30	Dinner at venue (sign up required – see sign-up)
20:30	Conference bus from venue to drop-off points in downtown Copenhagen
Wednesday 15 May	
08:30	Conference bus from pick-up points in downtown Copenhagen
09:00:09:45	Reception: coffee, tea & croissants
	AHA A3 and C2 presentations, session 3 and 4
09:45-10:15	Dr. Lucia Pannese, Savings and Better Quality of Life: Gamifying Rehabilitation

10:15-10:45	Prof. Giuseppe Liotta, Multidimensional determinants of higher use of hospital care services rate (not presented, replaced by Prof. C. Holland: A frailty profile)
10:45-11:15	Coffee break/ refreshments
	EIP AHA A3 + C2 presentations (session 4)
11:15-11:45	Prof.M. Vollenbroek-Hutten, Feasibility of ambulatory monitoring devices to monitor recovery of patients after a hip fracture treatment
11:45-12:15	Dr. Nikolay Koblyakov How a Municipality can foster the implementing of ICT solutions by PME Senior Care Operators. Based on successful experience of Riga City Hall and Senior Group.
	Exhibitions and posters
12:15-13:00	Lunch-to-go, poster visit, overview of exhibition
13:00-13:20	Prof. Henning Langberg, Copenhagen Univ.: Introduction to exhibition themes – Warm hands and technologies
14:00-18:00	Guided tours through exhibition + interactive exploration of exhibits Companies, developers, projects exhibitors 14:00 – 15:00: Visit to elderly care technology demo site (care home) in Lyngby / Sign-up invitations sent to conference delegates
18:15	Conference bus from venue to drop-off points in downtown Copenhagen
19:00	Conference Dinner at Restaurant downtown Copenhagen
Thursday 16 May	
8:30	Conference bus from Copenhagen pick-up points
09:00-09:30	Reception: coffee, tea & croissants
09:30-10:00	Prof. Thomas Bock (REACH PI), TUM; Prof. Henning Boje Andersen, DTU; Dr. Thomas Linner (REACH Scientific Director), TUM: Welcome and Overview
10:00-10:30	Prof. Andrew Sixsmith, Simon Fraser Univ.: Responding to the Challenge of Aging - The Canadian AGE-WELL Network of Centres of Excellence
10:30-11:00	Prof. Yeong-Ran Park, Dept. of Silver Industry, Kangnam University: Healthy and Active Aging in Korea from a Gerontechnology Perspective
11:00-11:15	Coffee break

11:15-11:45	Dr. Atsushi Hiyama, Univ. Tokyo: Geron-Informatics: Geron-Informatics: Techno-logical engagement for the elderly in physical, cognitive, and social activities
11:45-12:15	Dr. Friedemann Müller, Schön Klinik; Dr. Jörg Güttler, TUM; Lisa Schrader, Fraunhofer IAIS: Advanced sensing and Human Activity Recognition in early intervention and rehabilitation for older persons
12:15-13:30	Lunch
13:30-13:45	Rasmus Tolstrup Larsen, Copenhagen Univ.; Humira Ehrari, DTU: Wearable sensing and motivational strategies to enhance physical activity among older persons
13:45-14:00	Ole Stangegaard, A patient's perspective on using telehealth services
14:00-14:20	Christian Graversen, CEO Welfare Tech: Challenges and solutions in creating effective assistive technologies
14:20-14:45	Coffee
14:45-15:10	Dr. Thomas Visser, Philips Design: "Design to Engage – how design can help to create engaging health solutions"
15:10-15:40	Carlijn Valk, TU/e; Dr Kavous S. Niksirat, EPFL: Personalizing behaviour change strategies toward stimulating active ageing.
15:40-16:10	Dr. Lydia Vogt, DIN, Prof. Henning Boje Andersen, DTU, Dr. Thomas Linner: The role of standardisation for empowerment and ICT-based engagement of older persons
16:10-16:45	Plenary session: Q&A
16:45-17:00	Conference summary (Prof. Sixsmith)
17:00	End of conference
17:20	Conference bus to Copenhagen airport (approx. arrival 18:00)

AHA 2019 Conference: Part 1, 14 May	
Speaker(s)	**Title**
Malcolm Fisk	Ethical Imperatives around Product and Service Standards for Assistive Technologies
Maddalena Illario, Vincenzo De Luca, Giovanni Tramontano, Strahil Birov , Guido Iaccarino, Veli Stroetmann and the Blueprint working group	The European Blueprint for the digital transformation of health and care in an ageing society
M. Vollenbroek-Hutten, W. Oude Nijeweme – d'Hollosy ,L. Schrijver	E-Supporter: Personalized technology supported coaching of people with type 2 diabetes mellitus
Veronica Zavagli	Care for carers: an investigation on family caregivers' needs, tasks, and experiences.
Giuseppe Liotta, Olga Madaro , Maria Chiara Inzerilli, Maria Cristina Marazzi	Social interventions to limit the mortality increase during the summer 2017 heat waves in Rome – Italy
C. Holland, I. Garner, J. O'Donnell & H. Gwyther	Integrated Housing, Care and Support: Outcomes on frailty, psychological health and mobility
AHA 2019 Conference: Part 2, 15 May	
Lucia Pannese	Savings and Better Quality of Life: Gamifying Rehabilitation
Giuseppe Liotta, Francesco Gilardi, Paola Scarcella	Multidimensional determinants of higher use of hospital care services rate.
D. van Dartel, J.H. Hegeman,M.M.R. ollenbroek-Hutten	Feasibility of ambulatory monitoring devices to monitor recovery of patients after a hip fracture treatment
Nikolay Koblyakov	How a Municipality can foster the implementing of ICT solutions by PME Senior Care Operators. Based on successful experience of Riga City Hall and Senior Group.
Francois Patou, Carrie Peterson, Jasmin Wistoft, Dennis Nygaard, Sebastiano Piccolo, Hysse Forchhammer, Anja Maier	From crowd-sourced clinical research to designing personalised, preventive interventions: Physical activity, sleep quality, and cognitive functioning in individuals with symptoms of cognitive impairment

C. Holland, Ian Garner, Jenny O'Donnell, Holly Gwyther	A frailty profile for use in the community: Using frailty screening to build resilience

AHA 2019 Conference: Part 3, 16 May	
Speaker(s)	**Title**
Thomas Bock (REACH PI), Henning Boje Andersen, Thomas Linner (REACH Scientific Director)	Welcome and Overview REACH
Andrew Sixsmith	Responding to the Challenge of Aging - The Canadian AGE-WELL Network of Centres of Excellenc
Yeong-Ran Park	Healthy and Active Aging in Korea from a Gerontechnology Perspective
Atsushi Hiyama,	Techno-logical engagement for the elderly in physical, cognitive, and social activities
Friedemann Müller, Jörg Güttler, Lisa Schrader	Advanced sensing and Human Activity Recognition in early intervention and rehabilitation for older persons
Rasmus Tolstrup Larsen, Humira Ehrari	Wearable sensing and motivational strategies to enhance physical activity levels among older persons
Ole Stangegaard	A patient's perspective on using telehealth services
Christian Graversen	Challenges and solutions in creating effective assistive technologies
Thomas Visser	Design to Engage – how design can help to create engaging health solutions
Carlijn Valk, Pearl Pu,	Personalizing behaviour change strategies toward stimulating active ageing
Lydia Vogt, Henning Boje Andersen, Thomas Linner	The role of standardisation for empowerment and ICT-based engagement of older persons

POSTERS	
Author(s)	**Title**
Miriam Schaepers, Constanze Hesse	The Effects of Environmental Illumination on a Pick-and-Place Task in Younger and Older Age
Vincenzo De Luca	Procuring innovative ICT for patient empowerment and self-management of type 2 diabetes mellitus – PROEMPOWER
Stephanie Schmidle, Manuela Stürzer, Joachim Hermsdörfer, Carmen Krewer	The influence of foot position on static and dynamic standing balance in healthy older adults
B. Schäpers, C. Krewer, M. Steinböck, E. Koenig, F. Müller	Activity detection with wearables and ambient sensors in a clinical environment - Preliminary testing with healthy subjects
M. Steinböck, C. Krewer, B. Schäpers, E. Koenig, F. Müller	The transfer and trainings device activLife in neurological patients – a study protocol of a feasibility und usability trial
Mika Yasuoka	Open not Closed - Community-based Living Lab as Regional Management Method
Ad van Berlo, Mart Wetzels, Daan de Viet	Do ACTIVE: a promising way to keep persons with MCI active and healthy
Christos Kleisiaris, Simeon Panagiotakis, Ioanna Papathanasiou, Serena Alvino, Emmanouil Androulakis, Chariklia Tziraki	The role of home care in the prevention of cognitive decline and frailty syndrome
Federica Gilli, Spyros Skafidas Federico Stella, Luca Busettoa, Maria Letizia Petroni, Carlotta Chiari, Federico Schena	Using digital tool to improve long term efficacy of physical activity program in obese elderly subjets
Simona Budui, Sabrina Salvetti, Federica Gilli, Spyros Skafidas, Carlotta Chiari, M. Letizia Petroni,Luca Busetto, Federico Schena	Effects of an Intensive Inpatient Rehabilitation Program in Elderly Patients with Obesity
Henning Boje Andersen	Working Group for establishing a Nordic Chapter for Gerontechnology

Humira Ehrari	The effect of playful exercise
Rasmus Tolstrup Larsen	Criterion validity for step counting in four consumer-grade physical activity monitors among older adults with and without rollators
Stephanie Schmidle, Manuela Stürzer, Joachim Hermsdörfer, Carmen Krewer	The influence of foot position on static and dynamic standing balance in healthy older adults

ABSTRACTS

Part 1

Ethical Imperatives around Product and Service Standards for AT

Dr Malcolm J, Fisk
De Montfort University

This presentation appraises the role of standards in the context of product and service design; and discusses the ethical foundation that requires to be put in place. Such a foundation takes a step towards answering the question 'How do we make standards work for us (in the field of AT)?' Issues explored include the extent to which standards achieve their intention to draw together (in the standardisation process) an adequate range of stakeholders and therefore reflet an appropriate consensus of views. Reference points used (and which give pointers to the required ethical foundation) include ISO 26000 on Social Responsibility, the European Commission funded PROGRESSIVE project; and (drawing on 'Design Theory') the EIPonAHA promoted PUX (Personal User Experience) Guidelines.

The European Blueprint for the digital transformation of health and care in an ageing society

Maddalena Illario (1), Vincenzo De Luca(2),Giovanni Tramontano(2), Strahil Birov(3), Guido Iaccarino(4), Veli Stroetmann(3) and the Blueprint working group. (1) Campania Region, (2)Federico II University Hospital. (3) empirica Gesellschaft für Kommunikations- und Technologieforschung mbH (4) University of Naples Federico II

Introduction

Demographic change is a globally recognised and well documented societal challenge. The rising demand for health, social and informal care services due to the ageing population and a growing burden of chronic diseases is estimated to increase health and care expenditure in the EU on average by 1-2% of GDP until 2060. Moreover, limited public resources for health and social assistance encourage the choices of Member States to move towards paths of digital transformation of health and care in an ageing society. A shared vision is essential to mobilise investment and guarantee the commitment of all actors. For this reason, a grouped called Blueprint Partners was formed, comprising a number of industrial players, regional healthcare authorities, professional organisations and multi-stakeholder platforms such as the European Innovation Partnership on Active and Healthy Ageing. The Blueprint Partners initiated jointly a shared policy vision in the form of a European Blueprint on the transformation of health and care in Europe.

Objectives

European policy makers, civil society, professional organisations and the industry have developed a European blueprint to address the challenges in innovating better health and care provisions for the ageing society. More specifically, the Blueprint aims to:

1) reach out to more than 50 regions that will invest in the implementation and/or deployment of these large-scale, sustainable, digital solutions for active and health ageing;

2) reach a total of € 500 million investment in digital innovation for Health & care; and

3) reach an additional 4 million people in Europe that benefit from the digital innovations in active and health ageing.

Methods

Four initial key topic areas have been selected jointly by the Blueprint Partners to represent digital health and care priorities. The priority topic area descriptions have been refined by Blueprint Partners and the main results were presented during the EIP on AHA Conference of Partners on

February 27, 2018. Each topic area provides a detailed picture about the situation in Europe with regard to:

Needs addressed

- Key ICT-enabling technologies available
- Barriers and challenges to scaling up
- Potential solutions available or in development that address these challenges
- Recommendations and actions needed at different levels (regional, national, Member-State and EU) in order to promote innovation and achieve a triple win for Europe.

The Blueprint approach to identifying high-impact user scenarios in AHA is

adopted from the general "User Experience" design approach that has already been used in different settings such as in the software industry and even the health and care sector. With this approach technologies are being designed based on a deeper understanding of how a user from the target group will interact with particular technologies by developing "personas" and "persona scenarios".

The concept of a persona was introduced by Alan Cooper and is generally defined as a single, specific hypothetical/ fictitious person who represents a segment of the user population.

Results

Within the context of the Blueprint work and objectives, personas have been developed to envision realistic health and care needs of certain groups in the society. Twelve personas have been developed, representing different "population segments" with different health conditions and needs. They are grouped according to four points along a person's life-course (childhood/young adulthood, working age, retirement and age under 80, and aged 80+) and three groups of wellbeing or needs (generally well/good wellbeing, chronic conditions and/or social needs, and complex needs).

Conclusion

Using the personas and their representative needs as a starting point, the Blueprint Partners will work towards developing high-impact persona scenarios with using the following elements:

- Available best practices/solutions targeting personas' identified needs;
- Regions with strong experience, willing to provide the necessary knowledge and support to scale up and deployment across Europe;
- Considering interactions: personas with digital solutions, personas with other key actors, digital solutions with other digital solutions;
- Needs of other key actors (such as GPS, nurses, social carers, public health authorities, other care providers, etc.) who are involved in health and care provision;
- Focus on the outcomes and high impact on patients and the health care system;
- High scalability and replication potential.

E-supporter: personalized technology supported coaching of people with type 2 diabetes mellitus

M. Vollenbroek-Hutten[1,2], W. Oude Nijeweme – d'Hollosy[1], L. Schrijver [1]
(1) University of Twente, EWI/BSS Telemedicine, Enschede, The Netherlands
(2) ZGT Academy, Ziekenhuisgroep Twente, Almelo, The Netherlands
e-mail: m.m.r.hutten@utwente.nl

Background
Type 2 Diabetes Mellitus (T2DM) is an increasing disease in the Western world. A healthy lifestyle (physical activity, nutrition, medication intake, stress, smoking) is a key component in the management of T2DM. eHealth interventions have great potential in this. Although earlier eHealth interventions showed diverse results, some interventions were successful others were not. The reasons for this success or failure are not fully clear yet. What is known, is that low treatment adherence is a problem for eHealth interventions and preferences of end users are important to incorporate to ensure a fit between technology and end-users. Additionally, based on results of traditional face to face treatments, incorporation of behavioural change theories and strategies in eHealth interventions is hypothesised to improve effectiveness.

Objective
The aim is to develop and evaluate a platform, called e-supporter, for personalized evidence-based technology supported coaching on self-management of people with diabetes, to improve perceived quality of care and quality of life.

Methods
The e-supporter is developed using an iterative user centric design approach. It starts from a module on physical activity that was developed and appeared to be effective in people with chronic fatigue after cancer (Bruggeman-Everts, 2017). Starting from this and diabetes literature the content of this eCoaching module was developed in cooperation with health care professionals. Subsequently, 15 people with T2DM in treatment in second-line care tested the updated version on physical activity. Halfway and in the end telephone interviews took place about their experience, appreciation and feedback. The results of this formative evaluation were used for further improvements: the second iteration focused on further tailoring of the coaching content to individual end user needs and preferences, their individual goals and stage of change as well as their daily state of mind. Next to this, currently a second module with a focus on nutrition is being developed taking the same approach and the evaluation of this nutrition module will also be performed with people with T2DM.

Results
The e-supporter resulting from this development approach consists of a 9 weeks intervention. The intervention consists of monitoring modules to assess the relevant lifestyle behaviours in daily life i.e. physical activity with a wearable and nutrition with an app. Based on these data, individual preferences and self-efficacy beliefs an individually goal is set with the professionals. Starting from this the user receives 2 SMSs a day and a weekly tailored e-mail message. The SMSs and the e-mails are based on the different factors of the I-change model (de Vries, 2017); awareness, motivation, action, sustaining behaviour. Important used strategies are education, information and instruction, goal setting and action planning, self-monitoring, feedback and self-efficacy. For example in the weekly tailored e-mail it is being discussed to what extend the goal is being achieved and which next concrete implementation intentions can be made to actually achieve this goal. The people with T2DM who received the 9 weeks e-supporter for physical activity were positive about the intervention, for using the monitoring tools as well as receiving the SMSs and emails. They provided feedback that the SMSs were still too general, and they wished more personalized messages. Looking at health outcome on individual level, results show that especially individuals with a high self-efficacy and improper physical activity level at the start, improved their physical activity level.

Conclusion
Digital health coaching seems feasible and is appreciated by persons with T2DM. Including behavioural change models and strategies as basis for coaching is an effective strategy however more sophisticated personalization, tailoring and the availability of multiple life style modules is still needed.

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De Vries, H. (2017). An integrated approach for understanding health behavior; the I-change model as an example. Psychol Behav Sci Int J, 2(2), 555-585.

Care for carers: an investigation on family caregivers' needs, tasks, and experiences

Zavagli, V.[1], Raccichini, M.[1], Ercolani, G.[1], Franchini, L.[1], Varani, S.[1], Pannuti, R.[1]

[1] ANT Foundation, Italy

Introduction. Cancer is a family disease and the World Health Organization has recommended approaching patients and their caregivers as a 'unit of care', focusing on the overall well-being of the patient-caregiver dyad rather than just on the patient. Nowadays family caregivers are an invaluable part of healthcare teams whose needs remain unmet despite their active role in patient care. In fact, it is well known that family caregivers often give priority to their patient's necessities, although they have multiple unmet needs that have a negative impact on their quality of life and consequently on the quality of care they provide to the patient. Some studies indicate that caregivers' unmet needs are multidimensional, but limited research has investigated the psycho-physical disorders of home-cared cancer patients family caregivers and a systematic assessment of their necessities is rarely practiced. In fact, evaluation is often informal and undocumented, making caregivers' needs less "visible".

Objectives. This investigation was designed to better identify unmet needs and lifestyles' changes of family caregivers of oncological patients and subsequently correlate them with the patients' functional status in order to investigate if caregivers' needs change as the patients' functional abilities change.

Methods. Participants were enrolled in Italy among the caregivers of the patients assisted by the National Tumor Assistance (ANT) Foundation through its 20 specialized and multidisciplinary teams in 11 Italian regions. The 251 caregivers filled out autonomously a battery of self-report questionnaires (Activities of Daily Living - ADL; Instrumental Activities of Daily Living - IADL; Cancer Caregiving Tasks, Consequences and Needs - CaTCoN) and completed the first two questionnaires with reference to their patients' condition.

Results. Frequencies, mean and standard deviation scores for each CaTCoN item were calculated. Simple correlations were used to assess the statistical link between caregivers' tasks and needs and patients' functional status. The results confirmed that cancer care-giving is burdensome. Large proportions of caregivers experienced substantial caregiving workload related to practical help (63%), personal care (73.1%), and emotional/psychological support (67.7%). Regarding the consequences caused by caregiving, 69.5% of caregivers reported lack of time for social relations and 81.3% referred to experience distress. The caregiving workload and the negative social consequences had a negative and significant correlation with the scores of ADL and IADL. Furthermore, considerable proportions of caregivers experienced problems or had unmet needs regarding the interaction with the health care professionals (HCPs). Prominent problematic aspects included the provision of enough information to the caregivers: 54% of the caregivers reported that not enough time had been spent informing them and that often they had to ask the HCPs questions in order to get the information they needed (45.2%). More than half of the participants, 60% and 67.3% respectively, referred that the HCPs only rarely/never or sometimes paid attention to them and had shown interest in their feelings.

Conclusion. The results confirm that cancer caregiving is burdensome and that being a caregiver is demanding and has its costs. These findings are in agreement with previous studies. This investigation can be viewed as guidance for determining appropriate support services, providing high-quality care, achieving caregiver satisfaction, and decreasing caregiver burden. Such results will certainly contribute to develop and publish Guidelines and to provide programmes and on-going education where caregivers feel supported in their role. In particular, it would be innovative to develop a suitable Smartphone application that reflects carers' needs to support them in their role. Furthermore, investigations of this kind can urge legislators to recognize the caregivers' figure and improve their role and status. For this purpose, it would be interesting to extend the investigation to different European countries and to get data from CAREGIVERS in varied contexts (including gender, age, and CARE-GIVING situations).

References. Zavagli, V., Raccichini, M., Ercolani, G., Franchini, L., Varani, S., Pannuti, R. (2019). Care for carers: an investigation on family caregivers' needs, tasks, and experiences. *Translational Medicine @UniSa*, in press.

Ethics. The investigation received a formal approval by the Area Vasta Emilia Centro Research Ethical Committee of Emilia-Romagna Region (CE-AVEC). Participants gave informed written consent for participation to the investigation, data analysis, and data publication.

Social interventions to limit the mortality increase during the summer 2017 heat waves in Rome – Italy

Giuseppe Liotta1, Olga Madaro [2, 3] , Maria Chiara Inzerilli[2, 4], Maria Cristina Marazzi[5
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[2] "Long Live the Elderly!" program, Community of Sant'Egidio [3] Municipality of Rome, Italy
[4] Local Health Unit Roma (3), Rome, Italy [5] LUMSA University, Rome, Italy

Background: Heat waves are recurrent extreme climate events associated to increase of mortality, especially among older adults. Social isolation is one of the most important mortality risk factor during a heat wave. The aim of this study is to assess the impact of a program based on social interventions on older adults mortality during the heat waves occurred in Rome in the 2017.

Methods: The "Long Live the Elderly!" (LLE) program, carried out by the Community of Sant'Egidio in the centre of Rome since 2004, is aimed at counteracting social isolation by a pro-active monitoring of the over-75 population, providing them personal support in case of need as well as strengthening their social connections at community level with formal and informal caregivers who accepted to be involved in the program. Mortality of the whole population followed up during 2016-2017 (aggregated by month) has been compared with the mortality of an over-75 population sample, resident in the Lazio region, followed up by the University of Tor Vergata, Biomedicine and Prevention Department, that receive the standard of care. Non-parametric tests have been performed to assess differences of death rates and multivariate analyses to assess the impact of risk factors on mortality.

Results: From December 2015 to November 2017, the LLE population and the control population were made up by an average of 5,181 and 528 individuals respectively, comparable for age and gender. The monthly average death rate from June to September 2017 was 6.0/1000 (CL95%: 0.8-11.1) and 6.1/1000 (CL95%: 3.3-9.0) for the control sample and the LLE population respectively (p=0.8). Compared to the summer 2016 mortality, an increase of 100.7% and 12.3% among controls and LLE population respectively has been observed. The multivariate analysis, weighted for the summer 2017 population and adjusted for age, gender and pre-summer 2017 mortality, showed the protective effect of the LLE program (R2=0.504; β=-0.599; p<0.001).

Conclusion: A programme dealing mainly with the individuals' lack of social resources showed to be able to limit mortality of an older adult population, during an extreme climate event, like the heat wave, in a setting with poor community care services, as the Lazio region. Further analysis are needed to identify the key components able to affect the older citizens mortality as, for example, the role played by the urban heat island effect that is more relevant in Rome than in other regional settings

Integrated Housing, Care and Support: Outcomes on frailty, psychological health and mobility

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Introduction

This report provides research findings from a cohort study examining the health and wellbeing outcomes for people moving in to a group of retirement villages offering an "extra care" model that includes increasing care support as needs change. Key factors include a wellbeing programme, support for cognitive impairment if needed, and a socially and physically accessible environment. The findings are from the period 2012 to 2018. The focus of the background study is on residents living in ExtraCare Charitable Trust villages and schemes, examining markers of health, frailty and wellbeing for residents, and subsequent use and cost implications for health and social care. This paper will focus on investigating effects of time and relationships between indices of depression, anxiety, frailty and mobility indices.

Objectives

The objective of the analyses reported was to evaluate whether the extra care approach gave positive outcomes for healthy ageing. Wellbeing and frailty related data is now available from moving in (0 months) to 60 months later, with assessments taken at 3, 12, 18, 24, 36, 48 months in between. The study aims to compare residents with controls remaining in their original homes, and to comment on the role that purpose built retirement villages can have in the range of housing choices for both the fit and the frail.

Methods

The study began as a longitudinal repeated measures study but because of attrition and a desire to go beyond the originally planned 18 month study, we recruited new participants based on the duration people had lived in the ExtraCare environments. Thus growth curve analysis is used. This uses time since moving in as the main independent variable and examines change over time. 162 new residents and 31 controls took part at baseline (mean age 75 years), with reducing numbers over time. Participants were assessed for a range of physical and psychological health measures, (e.g. number of chronic illnesses, anxiety and depression, global cognition). A frailty index was calculated and measures of quality of life, health and social care usage and health behaviour (diet and exercise) were taken.

Results

The control group were significantly healthier than the residents on a range of measures, and despite efforts to age match, were significantly younger. However, this gave the opportunity to

examine age-related versus location-related effects. Over time, differences between the groups in some important aspects of cognitive function and in anxiety and depression reduced, with anxiety level being 23% less than at baseline for residents after 5 years. Once level of frailty was controlled for, there was no difference between the groups in depression, highlighting the role of frailty, rather than age. Linear regression analyses also demonstrated that the impact of mobility impairment on depression was less for the residents than for the controls. Walking speed improved over time for the residents, and this was shown to be an important mediator of the effect of time on depression. This analysis showed that if walking speed had stayed the same, depression would have increased over time. The number of times a person did 30 minutes or more of exercise per week increased over time, and this was related both to walking speed and to reducing falls, although falls did not decrease in the population as a whole after the first 18 months. When Residents were examined separately, there was a significant reduction in frailty over the first 36 months, after which frailty increased. Over the 5-year period, there was no clear increase in frailty with increasing age, in contrast to expectations based on previous studies. This is important and suggests that although frailty still increases with age, it is being delayed in the ExtraCare residents.

Conclusion

Over the five-year period since moving in, significant improvements can be found in ExtraCare residents' health and wellbeing. In some critical health factors where a downward trend might normally be expected with age, no such trends are emerging or are delayed.

Funding

This study was funded by the Extracare Charitable Trust but independently run and analysed by the researchers.

Ethics

This study was given ethics approval by the Research Ethics Committee at Aston University.

Part 2

Savings and Better Quality of Life: Gamifying Rehabilitation

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Objective

This presentation aims at discussing opportunities and barriers to remote rehabilitation, underlying the advantages of a gamified approach. It also calls for a shared reflection on how to facilitate the process of introducing digital supports to connected health and personalized medicine.

Description

This oral contribution is first presenting REHABILITY www.rehability.me , a best practice connected health solution, that allows patients to take part in neurological rehabilitation therapy both within a specialist facility and from home with continuous remote medical support. Co-designed with specialists and patients and resulting from two EU funded research projects, the product has proven research to show that it motivates elderly people to comply with the prescribed therapy, thus supporting therapy adherence.

Although already proven and stable, highly appreciated by specialists and patients in Europe and SE Asia and supported by a strong scientific bibliography, the product still fails to conquer the market.

Starting from this case discussion, the ultimate aim of this presentation is to debate what needs to be done to successfully introduce tools such as REHABILITY into the market, to effectively support connected health and personalized medicine. Although such a solution would clearly reduce costs of national health care systems and enhance the patients' quality of life at the same time, some organizational shortcomings and practical barriers are still hindering its adoption. This presentation calls for a common reflection on this situation.

Multidimensional determinants of higher use of hospital care services rate

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Background

European health systems forecast an increasing demand for hospital care, due to the increasing prevalence of non-communicable diseases as a result of epidemiologic transition. The understanding of the determinants that fuel the request for hospital care is crucial to plan intervention able to manage the request without overcoming the capacity of the hospital services. The aim of this study is to assess the determinants of using hospital sevices.

Methods

A randomized sample from the population of the Lazio region (Italy) above the age of 64 was enrolled in 2014 by the administration of a questionnaire to assess frailty; the rates of use of hospital services (hospital admission, DH accesses and Emergency Room visit) during 3 years following the enrolment have been retrieved by the regional database. Univariable and multivariable analyses addressed the association of health status, social and economic variables with use of hospital care services.

Results

The mean rate of use of hospital services was 785.5 per 1000 observation/year (robusts 561.0, pre-frails 731.6, frails 1,327.9 and very frails 1,362.2, $p < 0.001$). In the multivariate analysis, the higher rate of use of hospital services was independently associated with older age, lower education, presence of cardiopathy, worse functional status, living alone or without anyone able to help.

Conclusions

The medium-term use of the hospital services by older adults is independently associated with functional status, social resources, and physical status in a sample of older adults living at community level in poor community service environment, like Lazio Region. Policy makers who want to reduce Hospital Use should take into account this scenario instead of relying only on the assessment of the diseases prevalence which could bring to mistakes in the health services planning

Feasibility of ambulatory monitoring devices to monitor recovery of patients after a hip fracture treatment

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Introduction

Each year approximately 19.000 patients above 65 years are hospitalized with a hip fracture in the Netherlands. The goal of hip fracture treatment is functional recovery of the patient to the pre-fracture state. Currently, functional recovery is suboptimal in 53% of the patients. More insight in the patients' rehabilitation process is expected to enable further optimization of rehabilitation treatment.

Objectives

The aim of this study is to assess the feasibility of ambulatory monitoring devices to continuously monitor physical activity behavior of elderly patients after hip fracture treatment.

Methods/Approach

Based on a multi stakeholder requirement analysis, the Fitbit Charge and MOX Activity Monitor are chosen to monitor physical activity. To assess the feasibility of the sensors, patients wore them during the whole rehabilitation trajectory from hospital admission till admission from the geriatric wing of a nursing home. The Fitbit is worn around the wrist and MOX is placed just above the knee. The wearing comfort was assessed and the following parameters were measured to assess if a change in physical activity could be monitored: number of steps, heart rate, longest activity block, and number of active and sedentary minutes.

Results

At the moment 38 elderly patients are included (21 analyzed). The preliminary results of the Fitbit (n=12) and MOX (n=9) show that both sensors do have the potential to monitor changes in physical activity. On average all parameters show an improvement meaning that the activity parameters (number of steps, longest activity block and number of active minutes) increase during the course of the rehabilitation and that heart rate and the number of sedentary minutes decrease. However, there is a large variability between subjects in the amount of progress made as well as in the parameters on which progress is being shown. Results also show that compared to the standard

point in time clinimetry, were bad and good days, that often occur, can cause inadequate reflection of the actual status of the patients, this continuous monitoring is less sensitive for this and as such more adequate. However, results also show that the feasibility of the Fitbit in the elderly population was suboptimal. The Fitbit is, in contrast to the MOX, not able to count the number of steps correctly when walking with a rollator, because no arm movements are made. With regard to the wearing comfort, the results show that both sensors are well tolerated.

Conclusion

Ambulant monitoring of recovery after hip fracture using of the shelf sensors like Fitbit and MOX is feasible and do have the potential to get more in depth insight in the rehabilitation process of patients with a hip fracture compared to standard point in time clinimetry. The large variability between subjects on amount progress made as well as the parameters on which progress is being shown argues for a more personalized approach which can be enable such continuous monitoring devices.

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Nijmeijer WS, Folbert EC, Vermeer M, Vollenbroek-Hutten MMR, Hegeman JH. The consistency of care for older patients with a hip fracture: are the results of the integrated orthogeriatric treatment model of the Centre of Geriatric Traumatology consistent 10 years after implementation? Archives of Osteoporosis. 2018;13(1):131

Ethics

This feasibility study was approved as not subject to WMO. All participants signed informed consent prior to participation.

How a Municipality can foster the implementing of ICT solutions by PME Senior Care Operators. Based on successful experience of Riga City Hall and Senior Group

Nikolay Koblyakov, Senior Group, Paris
"Senior Group" Oral Lecture Proposal.

Background information

Implementing and scaling up of open solutions/platforms for AHA is one of the 3 important objectives of renovated action plan of AG C2 for 2018-2020. The reasons why Innovative Public Procurement are not often launched by Public Administrations and municipalities have to be examined and the alternatives proposed. We are going to present the guidelines and standards to easily combine a variety of solutions for communications between ICT developers, Municipalities and Social care
operators. We intend to share the positive experience of Riga City Hall and Senior Group of alternative to traditional recommended Innovative Public Procurements for ICT independent living solutions, while Municipalities act as Public Administrations.

Speaker

Senior Group

- Mr. Nikolai Koblyakov, PDG, kobliakov@senior-group.fr , +33 6 0725 8031,www.senior-group.fr

Relevance to and alignment with the priorities of the EU in the digital innovation for active and healthy ageing

- Better data to advance research, disease prevention The mobile applications used in the basic models of services provided by Senior Group with help of ICT and ordered by Riga Municipality collect and store the data (upon receipt of consent).
- personalised health and care;
  The mobile APPlications that are used in SME Operator- Municipality co-operation assures the new level of personification of care. The senior-coding application assures the permanent adaptation of care plans of operator, completely opened for control from the Municipality side for instance.
- digital tools for citizen empowerment and person-centred care The distribution via reference sites networks of the developed in workshop road map for aged- care operator and municipality for implementing of ICT solutions (based on AALdeveloped example) in
- municipality will help to advance the person- centered care in area of other's than Baltic states regions.

Quadruple helix approach

We believe that 'laissez faire' regime, where industry, based on the feedback from
Media/civil society is leading the innovative capacity in the presented framework, ruled

by municipality and academia provides support in terms of knowledge is more useful than "statist regime" where government leads by driving the innovative capacity of industry, or than "balance regim" where the universities play the most important role.

Target audience

- Regional Public Administrations;
- Local Public Administrations;
- Industry;
- Senior Care PME Operators (they are definitely a part of industry, but we consider the manufacturer of ICT solutions as industry usually)

Geography

Riga is the biggest city of the Baltic countries (Estonia, Latvia, Lithuania). Currently there are no reference sites in any of these countries. We work to assure the fact that the successful experience of Senior Care PME of cooperation with city halls of Tallinn, Vilnius and other Baltic cities will be presented there and the participants of many Eastern European countries, mainly from North (Estonia, Latvia, Lithuania, Poland) to take part in a WorkShop.

C2-D4 connection

Also one of the ICT solutions to be used as an successful example of the Municipality-Operator cooperation- the mobile Application "EIP-AHA Profiling Motivation Application prototype" was drawn out in 2018 as the C2-D4 working group co-operation outcome.

Signature

Nikolay Koblyakov, Senior Group, Paris. 23/4/2019

From crowd-sourced clinical research to designing personalised, preventive interventions: Physical activity, sleep quality, and cognitive functioning in individuals with symptoms of cognitive impairment

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Background: An estimated 18.7% of the general population lives with Mild Cognitive Impairment (MCI) [1], a syndrome characterized by a cognitive decline greater than expected for an individual of a given age and education level, but that does not notably interfere with activities of daily life [2]. Around 38% of MCI cases develop into dementia within 5 years [3]. For older adults, physical activity has been correlated with preserving cognitive functioning as well as promoting better sleep quality [4]. Likewise, studies have shown that sleep disturbances promote cognitive decline and other neuropsychiatric features [5], [6]. Although these associations between physical activity, sleep quality, and cognitive functioning are widely acknowledged, the mechanisms leading to the observed patterns are yet to be determined.

Objective: Observe associations between and among physical activity, sleep quality, and cognitive function. StanfordMedicineX | Precision Research Challenge. See also:https://medicinex.stanford.edu/2018/08/01/dtu/

Methods: This study investigated the links between cognitive function and both average and daily sleep quality, and physical activity levels. The team, consisting of graduate design engineering and neuropsychology students, early and experienced health and engineering researchers, worked closely with the study participants and was advised by a leading hospital neuropsychologist. Variables were considered across three data sources: the Montreal Cognitive Assessment test (MoCA) for cognitive function, the Withings Steel HR watch for tracking physical activity, and the Aura system for monitoring sleep quality. Data analysis included exploration and multiple linear regressions using backwards predictor selection.

Preliminary results: Data from 54 participants aged 52-86 with baseline MoCA scores between 17-27 shows a positive association between MoCA scores at baseline and average number of daily steps (log, p=0.0124), average day-time heart-rate (p=0.043), and mean time to fall asleep (p=0.033) over the following 6 months. Individually, there was not a significant association between average daily steps and average sleep duration (neither REM, deep, nor total); yet, daily steps (log) were associated both with REM sleep duration (p = 0.000114) and the total sleep duration (p=0.00116) for the night following.

Conclusions: This study addressed modifiable risk and protective factors for dementia prevention. Results support a positive association between average physical activity level, average day-time heart rate and cognitive function within a relatively homogeneous population

of individuals with symptoms of MCI. Data suggests that physical activity during the day has a positive influence on the REM, deep, and total sleep durations for the night following. Limitations to the study included recruitment bias as participants were not randomly selected among a homogeneous population suspected of MCI. The length of the study and sample size limit robust conclusions.

The significant association of average daily steps with baseline MoCA scores alone calls for an interventional study to explore causal links between physical activity and cognitive function. Although significant associations between average sleep durations and MoCA scores were not found, the suggested influence of daily physical activity on nightly sleep durations calls for further research on the possible mediating role of sleep quality in the cognition-physical activity relationship.

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Further information

- Engineering Systems research group: www.es.man.dtu.dk
- Engineering Systems research team finalists in Stanford MedicineX competition: Using wearable technology to explore dementia risk factors. https://medicinex.stanford.edu/2018/08/01/dtu/
- Connection sleep, activity, cognitive function: http://www.cachet.dk/news/2018/07/physical-activity-sleep-and-cognitive-function?id=b5404953-5645-4e94-8dd8-7ed88ca29cb1

A frailty profile for use in the community: Using frailty screening to build resilience

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Introduction: Frailty is defined as a state of high vulnerability for adverse health outcomes when exposed to a stressor. Previous studies have described accumulated deficits profiles of frailty, and their use to predict mortality and institutionalisation is well evidenced. However, community use of frailty assessment in non-medical facilities to inform social care support decisions, lifestyle and prevention strategies has been less explored. This paper describes the validation of a community-based frailty index based on self-declared diagnoses and objective assessments. Importantly, it includes psychological as well as physical variables. The presentation will then go on to introduce new developments in ways of using this frailty screening to support building resilience and encourage uptake of health behaviours that may reduce frailty.

Methods: Prediction of outcomes was examined using regression analyses: level of homecare, quality of life, and mortality, based on data from older people living independently in extra care retirement villages. The validated tool was then further reduced using statistical methods and published evidence to produce a usable but holistic measure. Comparison with other tools was made as part of the validation. The tool was then used to create a tablet based application for use by wellbeing advisors to screen for frailty. Behaviour change methodology was incorporated to encourage residents to take up activities known to have positive impacts on frailty and resilience. Co-creation methods were used with a range of end users to ensure acceptability. Feasibility studies were conducted with both paper and app based versions of the tool.

Results: Area under the curve (AUC) compared goodness of fit for mortality with other published frailty indices, comparing favourably. Care level and whether or not someone received social care 12 months later was reliably predicted in linear regression. Baseline Physical Frailty predicted 18.4% of the variance in care needs 12 months later but cognitive function added 11.4% and depression a further 2.5%. In logistic regression the tool reliably predicted whether or not someone received social care (Chi-squared = 68.04, p<0.001) and could also distinguish between those who had a fall or not over the next 24 months (Chi-Squared = 10.62,p<0.01).

The pilot work enabled production of an evidenced app that is now being fully tested and scaled up across 17 retirement villages in the UK.

Conclusion: Frailty indices can be used to predict a range of outcomes that are useful in community health and non-clinical environments. So long as there was a clear purpose to screening, frailty (or resilience) screening was acceptable to older adults. However, we know from other work that frailer people need more support to achieve their goals.

Part 3

Prof. Thomas Bock (REACH PI), TUM; Prof. Henning Boje Andersen, DTU; Dr. Thomas Linner (REACH Scientific Director), TUM: Welcome and Overview REACH

Abstract: Active Healthy Ageing (AHA) systems such as REACH turn clinical and care environments such as homes, home care, and everyday life, day care centers, and other geriatric facilities into highly personalized and data-driven early intervention settings that engage older persons in meaningful preventative and rehabilitative activity (primarily physical activity but also with regard to cognitive, mobility, social, and nutritional aspects). A unique feature of REACH is the integrated utilization of personalized behavior change and engagement techniques informing the deployment of the toolkit elements (sensors, interfaces, devices, etc.). REACH implements a combination of wearable and ambient sensors for each Touchpoint along with a set of co-adapted Machine Learning elements. Personalized Intelligent Interior Units (PIUs) are used to integrate the above described functional elements physically and seamlessly into daily life.

Prof. Andrew Sixsmith, Simon Fraser Univ.: Responding to the Challenge of Aging - The Canadian AGE-WELL Network of Centres of Excellence

Abstract: Information and communication technologies (ICTs) have huge potential to enhance the health, well-being, and independence of seniors, and also open up opportunities for new services and businesses. ICTs can be used to meet the desire of most seniors to age in place and to provide solutions to increased demands on health and community services. Despite this "win-win" scenario, the actual impact of research has often been limited, with good ideas and technologies failing to be turned into new products and services. This presentation looks at how AGE-WELL (Aging Gracefully across Environments using Technology to Support Wellness, Engagement, and Long Life NCE Inc.), a Canadian Network of Centres of Excellence (http://www.agewell-nce.ca), is working towards taking the outcomes of great research from the laboratory into the real-world.

Prof. Yeong-Ran Park, Dept. of Silver Industry, Kangnam University: Healthy and Active Aging in Korea from a Gerontechnology Perspective

Abstract: In Korea, people aged 65 or older make up 14.3 percent of the population, but this ratio is expected to reach 40.1 percent in 2060. As one of the fastest aging countries in the world, there is an increasing demand for policy and practice innovations to support healthy and active aging in Korea. In order to respond more effectively to the challenges of the speed and the magnitude of population aging, the Korean government has introduced legislations such as Low Fertility and Aging Society Act, Act for Long-term Care Insurance for the Elderly, Act for Promotion of Age-friendly Industry and Dementia Management Act. Morever, with recent developments in the 4th industrial technologies, more interests and R&D funds are being invested in the field of gerontechnology. This presentation will introduce some latest projects such as Mobile-based & customer-oriented INtegrated platform Development for Mental health OutReach services for older adults (MIND MORE), ICT-based community care services for lone elders(Ministry of Health and Social Welfare), KB Good Memory School and robot care service. Implications for improving accessibility, usability, and the linkage between health and social care will be discussed.

Dr. Atsushi Hiyama, Univ. Tokyo: Geron-Informatics: Geron-Informatics: Techno-logical engagement for the elderly in physical, cognitive, and social activities

Abstract: Abstract: In the latest statistics in 2017, the demographic ratio of people over 65 in Japan is 27.7%, creating what is being called a "hyper-aged society." Although there are countless challenges posed by an aging population, they can be overcome by the power of ICT. Geron-informatics is a newly coined term for this research field in computer science that encompasses work in which computer-based and interactive technologies are being designed and evaluated to resolve issues posed by hyper-aged societies. In this talk, I will introduce our empirical research projects being conducted on HCI/VR for improving elders' social participation and promoting healthcare activities for the elderly.

Dr. Friedemann Müller, Schön Klinik; Jörg Güttler, TUM; Lisa Schrader, Fraunhofer IAIS: Advanced sensing and Human Activity Recognition in early intervention and rehabilitation for older persons

***Abstract*:** One of the objectives of our efforts in EU project REACH is to reduce the duration of hospitalization and avoid a decline after discharge that possibly results in readmission. In the talk we report on this subproject where several key indicators and assessments were defined to trace the patients' Activities of Daily Living and their health condition. To monitor activities and biometric signals, specific wearables, ambient sensors, and activation devices were used and evaluated in clinical trials at SKBA. We describe the validation of sensors and the processes and assessments for the early detection of the users' health status in the test scenario. A model of a typical patient room at our clinic was used as an initial scenario and lead use case. The room and the test settings are strictly based on modular principles (physical modularity, modularity of sensors, etc.), so that adapted versions for care homes and home care environments can be generated.

Rasmus Tolstrup Larsen, Copenhagen Univ.; Humira Ehrari, DTU: Wearable sensing and motivational strategies to enhance physical activity levels among older persons

Abstract: There is an increasing recognition that physical activity is an efficient "medicine" for especially older adults. They will benefit from increased physical activity in terms of lower mortality and a higher everyday function. Frailty has previously been seen as irreversible, but emerging results show otherwise. The most important barrier to higher activity levels is lack of motivation; hence, efficient motivational strategies are highly important if national strategies on physical activity programs are to succeed. We present results from several studies with different motivational strategies, including playful exercise and feedback on activity levels and we discuss measurement properties, and the social and motivational prospects of modern health technology.

Ole Stangegaard: A patient's perspective on using telehealth services

Abstract: Based on personal experience from an inclusion since 2013 in 'The Epital', a tele medicine project for COPD patients, the presentation will describe the functionality of the project emphasizing the patient interface. Some problems encountered and results achieved by the Epital will be discussed and possible future developments described. The experiences gained so far have resulted in development of 'The Citizen's Manifesto of e-Health'. This document intended as a 'yardstick' for evaluation of different COPD tele medicine systems will be briefly presented and commented.

Christian Graversen, CEO Welfare Tech: Challenges and solutions in creating effective assistive technologies

Abstract: The demographic challenge has been a strong motivation for investing in assistive technology for the last fifteen years. Many new technologies fail because they don´t address a clear NEED, has a defined APPROACH to market, has a compelling BENEFIT for customer or an understanding of what the COMPETITION is to fulfill the need. This presentation will use cases to demonstrate challenges and solutions in creating effective assistive technologies.

Dr. Thomas Visser, Philips Design: "Design to Engage – how design can help to create engaging health solutions"

Abstract: It is important to have patients actively engage in being and staying healthy, as this improves their health outcomes, as well as overall healthcare efficiency and patient experience. At the same time, healthcare today is delivered more and more through a complex ecosystem of connected technologies, services and professionals. Philips Design is exploring how we can design and leverage such an ecosystem to increase patient engagement. The work presented will touch upon guidelines for engagement and behaviour change, as well as provide a sneak peek into the ground breaking design research methodology to which the REACH activities have contributed so far.

Carlijn Valk, TU/e; Pearl Pu, EPFL: Personalizing behaviour change strategies toward stimulating active ageing

Abstract: This presentation will give an overview of how personalised behaviour change strategies have been designed into the interventions to stimulate active ageing. Through a field test with older adults using Fitbit from the Meet&Greet centre and the REACHhealtytogether app co-designed with older adults, the researchers demonstrate how the different social support strategies suport different older adults to be physically active. Both data analytics and machine learning algorithm were applied to help identifying the personalised strategies.

Dr. Lydia Vogt, DIN, Prof. Henning Boje Andersen, DTU, Dr. Thomas Linner: The role of standardisation for empowerment and ICT-based engagement of older persons

Abstract: Standardisation is a key strategic tool of REACH to build a network with relevant stakeholders within Europe and worldwide, disseminate the new developed technologies and concepts for empowerment and ICT-based engagement of older persons in a sustainable manner and support their sustainable transfer into the market. This is achieved, amongst others, by actively contributing to the work of the newly founded ISO Technical Committee Ageing Societies. Furthermore, a specification on European level on guidelines for introducing tele-medical and pervasive monitoring technologies balancing privacy protection against the need for oversight and care is in the process of being developed.

Poster abbstracts

The Effects of Environmental Illumination on a Pick-and-Place Task in Younger and Older Age

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The ability to pick up and place objects is essential to many everyday activities, thus a decline in this ability can mean a threat to a person's independent living. The purpose of the study was to investigate how grasping movements in a pick-and-place task are affected by different indoor lighting conditions in older and younger adults. Our hypothesis was that older participants will struggle more with performing quick and accurate actions under lower lighting conditions than younger adults. The sample consisted of 15 older participants (mean age=71 years; SD=3.2) and 18 younger participants (mean age= 21years; SD=1.8). Participants were asked to grasp, pick-up, and place a water glass in three different lighting conditions (bright: ~410, medium: ~12, and dim: ~0.002 lux). An electromagnetic motion tracking system (trakSTAR) was used to record hand movements. The results indicated that total movement time and the time needed to place the glass increased with decreasing illumination for all participants. Furthermore, interactions between illumination and age suggested that older participants slowed their movements more than younger adults under the lowest illumination level. As expected, all participants' accuracy decreased with decreasing illumination. Most interestingly, however, older adults were considerably more accurate than younger adults in all conditions. The findings suggest that older adults place much greater value on maintaining high accuracy in all lighting condition than younger adults and that this comes at the cost of increased movement times. Therefore, high illumination levels appear to be important for accurate and fast pick-up-and-place movement regardless of age, however if movement time is important bright lighting appears to be particularly important for older adults.

The study was approved by the ethics committee of the School of Psychology at the University of Aberdeen and was conducted in conformity with the Declaration of Helsinki.

Keywords: Aging, Environment illumination, Pick up and place, Reach-to-grasp,

Procuring innovative ICT for patient empowerment and self-management of type 2 diabetes mellitus – PROEMPOWER

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Introduction

Diabetes mellitus is a chronic disease with a broad spectrum of severity, accompanied by many concomitant conditions, complications and development stages. Its prevalence is increasing worldwide towards becoming a pandemic, representing an ever greater burden on health care systems (Bommer et al., 2017).

Objectives

PROEMPOWER is an European funded project under Horizon 2020 programme, with the aim of purchasing R&D services, through a PCP procedure, in order to develop an innovative IT solution for early diagnosis and management of diabetes, facilitating the lives of people with type 2 diabetes, supporting them in their daily lifestyle choices and giving healthcare professionals access to the clinical data needed for the management of the disease and its complications (ProEmpower consortium, 2018). The project involves four public procurers across Europe – Turkey, Portugal, Campania and Murcia.

Methods

The four procurers requested the development of a Shared Care Plan, accessible by patients and healthcare professionals, to enable them to use a common entity/document that uses relevant information about the patient's diabetes management and allows for scheduling events and reminders, such as follow-up visits and regular tests. The Shared Care Plan is to allow both patients and professionals to enter data such as measurements, while giving each specific rights to do so and integrating data captured directly from devices.

The requirements associated with delivering training to diabetic patients in various disease stages include the topics of: Physical activity and exercise; Tobacco and alcohol consumption; Hygiene (mouth, feet); Complications from and prevention of diabetes; Hyper- and hypoglycaemia and blood glucose self-control; Diet and nutrition; Insulin therapy and injectable drugs; Drug therapy; Life with diabetes; Sleep and stress avoidance. Measurement of parameters used by health professionals and patients to manage the disease are transferable to the main ProEmpower solution, including automatic data transfer from device. The solution is furthermore able to deliver messages

to the patient, including messages formulated by a professional and those automatically generated through data analysis - notifications of deviation from goals, tips for better management, etc. ProEmpower procurers have requested a platform capable of tapping neighbourhood and/or family resources to deliver patients with co-operative diabetes support. This online platform is also for diabetic patients to communicate and be trained on their disease. Professionals may also use it to exchange ideas with colleagues and provide advice to patients. (De Luca et al., 2019).

Results

At the core of ProEmpower is a competitive R&D process comprising three phases:

- PCP Phase I: Concept design, solution architecture and technical specifications
- PCP Phase II: Development of prototype systems
- PCP Phase III: Development and testing of pilot systems.
- Three supplier consortia have been selected for phase II of the ProEmpower PCP:
- DM4ALL – consortium led by Gnomon Informatics SA (Greece)
- CarpeDiab – consortium led by Health Insight Solutions GmbH (Germany)
- DiaWatch – consortium led by Tech4Care srl (Italy)

Two of them have been selected for phase III (testing) of the ProEmpower solutions

Conclusions

The ProEmpower procurers have produced a comprehensive set of specifications for value-based pre-commercial procurement of innovative ICT for empowerment and self-management of diabetes mellitus patients. The requirements, use cases and process models reflect the joint needs of four European regions – Turkey, Portugal, Murcia and Campania. Proempower will contribute to the management of type 2 diabetes mellitus by patients and will allow a harmonious development of the digitization of care services for patients with diabetes throughout Europe

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The influence of foot position on static and dynamic standing balance in healthy older adults

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Introduction

Deficiencies in postural control due to a decline in sensory and motor functions are the main causes for increased number of falls during aging. To quantify balance disorders and the risk of falls, it is crucial to record the static and dynamic aspects of balance. Posturography is an objective and quantitative biomechanical method for the analysis of human postural control. Although some standardized test procedures for posturography exist, e.g., the Sensory Organization Test, there is no standardization for the positioning of the feet during most of these measurement. As there is general consensus that the base of support – in unsupported standing defined by the feet – is an essential component in postural control, this aspect needs investigation.

Objectives

The aim of this study was to investigate the influence of different feet positions on posturographic parameters during static and dynamic standing in healthy older adults.

Methods

A total of 15 healthy elderly (age: 66 ± 5.6 years; body height: 166.9 ± 7.7 cm; body weight: 68.8 ± 16.7 kg) participated in this study. Sensory function (tactile, proprioception/position sense, vibration) was assessed prior to posturography. Participants completed five conditions on a Kistler force platform: a condition with self-selected foot position and four conditions with set feet distances (feet together, 10 cm, 20 cm, 30 cm). Distance was measured between the middle of both heels. In each condition measurements were done for 60 seconds for static standing (as still as possible) and dynamic standing (limits of stability testing (LOS) in eight different directions). Maximal sway amplitudes of the center of pressure recordings were analyzed in antero-posterior (A-P) and medio-lateral (M-L) directions. A repeated measurement ANOVA was used to analyze differences between several feet position. Bonferroni post-hoc tests were used for pair-wise comparisons. Alpha significance level was set at 0.05.

Results

Repeated measurement ANOVAs revealed significant differences between the static and between the dynamic foot positions. In static standing, values in the A-P direction showed the significantly greatest values for the feet together condition. In M-L also the 10 cm condition produced significantly greater values than the 20 cm, 30 cm, and self-selected conditions. Moreover, standing with feet together led to significantly greater values compared to all other feet positions. LOS analyses revealed that the conditions 'feet together' and '10 cm' were significantly lower compared to all other conditions. All other comparisons were not significantly different. In

addition, the best foot position was detected for each participant, i.e., the greatest or lowest values of static and dynamic conditions, respectively. The analysis showed that this position was always between 20 and 30 cm (mean 26 cm). The sensory assessment showed only minor abnormalities across the elderly subjects. Participants with slight deviations showed no statistically significantly different values compared to subjects without deviation.

Conclusions

In using posturography for static and dynamic standing balance, the foot position should be self-selected by the participants, representing a more natural, highly used posture. Regarding the influence of the sensory system, participants with slight deviations in the tested sensory subsystems showed no differences compared to participants without deviations. In order to test whether the sensory system has an impact on balance in different foot positions and whether this correlates with the number of falls, further research with older participants having sensory deficits and a history of previous falls should be conducted.

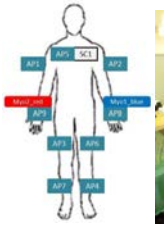
The work presented in this paper was made possible in part by funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 69042.

Activity detection with wearables and ambient sensors in a clinical environment - Preliminary testing with healthy subjects

B. Schäpers, C. Krewer, M. Steinböck, E. Koenig, F. Müller

In the REACH project the Schoen Clinic Bad Aibling is the use case for the application scenario rehabilitation. The system specific algorithms have to be trained to detect the patient's condition and its relevant changes. For this process the comparison of datasets from healthy subjects and patients are needed. Based on the data analytics, the intervention concepts can be personalized and adjusted to the needs of specific users. At the Schoen Clinic Bad Aibling patients with diagnoses such as stroke, Alzheimer's, Parkinson's or Critical Illness Polyneuropathy will be measured.

The data collection focused on the recognition of activities of daily living (ADL runs) and repeated sequences (drill runs). Immediately after the runs, the data were analyzed for its quality and integrity. Data experts from Fraunhofer Institute for Intelligent Analysis and Information Systems (FIAIS) annotated the sequences to allow thedetection of specific activities, e. g., eating, taking medication, sleeping. The annotation strategy is based upon the concept of the "Opportunity data collection experiment" from Roggen et al., 2010.



n	Wearables
9	ActivPAL™ (AP1-9)
1	SmartCardia (SC1)
2	MyoArmband (Myo1_blue, Myo2_red)

In October 2018 Schoen Clinic Bad Aibling together with the TU Munich (TUM) and FIAIS performed a 5-day methodology development workshop in the laboratory apartment at TUM. The testing was a pre-trial with 5 healthy subjects to evaluate the feasibility of the complex trial protocol, the possible strains for the patients, and the data handling. Further aims of the workshop were to define the exact timing for the measurements with patients and obtain data of healthy subjects as a baseline dataset. Additional to these aims resource requirements, handling of the sensor set, a standardized synchronization procedure, and the roadmap for the data annotation (with ELAN) were evaluated. The protocol followed key-items of activities of daily living (ADLs)

(Mahoney, 1965). ADLs are important parameter to describe the patients' health status and indicating changes.

In April 2019 the test setting was transferred into a patient room at Schoen Clinic Bad Aibling. In a 2-day data collection workshop the handling of the protocol was evaluated in the clinical environment. The protocol and sensor setting was adapted to the requirements requested from the ethics committee. One healthy subject was measured with 4 ADL runs and 3 drillruns.

This lead to fundamental considerations regarding data quality, data protection, and ethical and legal issues. Due to the commencement of the GDPR General DataProtection Regulation in May 2018, an in-depth analysis of data handling and processing in the project had to be developed. This required a close collaboration with the technical partners, the Ethics Committee, the Data Protection Officer, and specialized lawyers.

Central elements of the discussion were data transfer, data storage, data sharing of pseudonymized and personal data, allocation of responsibilities, automatic information processing, and compliance with user rights.

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The transfer and trainings device activLife in neurological patients – a study protocol of a feasibility und usability trial

M. Steinböck, C. Krewer, B. Schäpers, E. Koenig, F. Müller

Activities of daily living, such as getting up from a chair and sitting down safely, are prerequisites for maintaining autonomy in older people and patients. Difficulties and uncertainties during this transfer performance can lead to an inactive lifestyle and thus a deterioration of the general health condition. Various aspects of the sit-to-stand and stand-to-sit transitions are also associated with an increased risk of falling[10]. In order to maintain or re-establish that elderly people can live independently as long as possible, these transfers need to be trained. Transfer devices can assist the training of a secure position change. Within the modularly built REACH system, the device *activLife* (Alreh Medical, Poland) is one of the activation modules that can be used to support the transitions. The feasibility and usability of the *activLife* as a transfer aid for performances from sitting to standing and from standing to sitting will be evaluated in the Schoen Clinic Bad Aibling.

In order to quantify normative values for transfer movements without transfer device in healthy elderly and to elaborate the influence of several neurological diseases, a literature search was performed.

Nine studies were found to have investigated this motor function. Of these studies, 3 included healthy elderlies[9,3,4], 2 were performed with patients having Parkinson's disease[6,10], 2 observed patients with paraparesis[5,2], and 2 measured patients after a stroke[7,1]. Most studies used the FTSST (5 times sit-to-stand test) as the standardized assessment. Bohannon (2006) published values across the age span from 60 to 89, ranging from 11.4 to 14.8 seconds. As a general finding from all studies, a cut-off value of 15 seconds was found to be critical with respect to the risk of fall occurrence. A duration of more than 15 seconds doubled the risk of falls. In patients with Parkinson's disease, a value of 16 seconds discriminated between fallers and non-fallers. No values were established for patients with paraparesis, as the standardized procedure does not allow any additional walking tools to perform the test.

These reference values are essential in setting individual goals for the REACH system. In addition, a modification the 5xSST for patients with paraparesis is needed, allowing the use of aids. Optionally, the *activLife* could be a possibility for a standardized procedure. This would also open to test more severely affected patients who are not able to perform the transfer movements.

Open not Closed - Community-based Living Lab as Regional Management Method

Mika Yasuoka,Atsunobu Kumura

Introduction

Omuta, once a city of coal mining, is a typical rapidly aging city in Japan. The aging population (+ 65) is 35.7% (2018) and the third biggest aging ratio in Japan. The last decade, local citizens have expressed their worries of people with dementia who lost their way and failed to be found for a long time. Helping seniors with dementia who wanders has become one of the most urgent problems to be solved together with other worries such as an increase in isolated deaths among the city's elderly. The city of Omuta, Japan has conducted diverse experimental and spontaneous initiatives, together with people with dementia, industrial partners, municipalities, local care institutions, and citizens, and made substantial achievements.

Due to a need to protect people with dementia from wandering and getting lost, majority of senior houses for people with dementia usually takes a strategy to keep institutions closed. Some institutions build closed inner garden and others make fake doors and bus stops. A Danish care institution places fake bookshelf wall papers at the entrance door so that people will not get out from their section by accident. A German public transportation department partners with local care associations to construct exact replicas of standard bus stops outside of care homes (Telegraph, 2008). Some cities such as Demensby (Denmark) and Hogeweyk (Holland) established closed small inner city with physical walls only for people with dementia. Although these strategies would diffuse the panic and anxiety of people with dementia who get lost and missing or who want to go back home, it would generate ethical challenges (Hendriks and Kamphof, 2017); *Are we allowed to trick people with dementia for their safety reason? Is segregated utopia for people with dementia is optimal solution?*

Objectives

The City of Omuta, on the other hand, took an open community model, as a substitute of a closed space for people with dementia, which guaranteed, to some extent, secure unlimited interaction with local community. As a leading and unique open community case, the city of Omuta (Yasuoka, 2017) attracted attentions. However, after 10 years with a big applause, the City of Omuta realized importance to establish comprehensive eco system rather than conducting varied individual initiatives which lack interconnectivities and sustainability. The City of Omuta sought for an appropriate regional management strategy which embody their philosophy of Citizen Centre Care and achieve sustainability on finance and human resource.

Methods

To understand and suggest sustainable solutions for the city of Omuta, authors (university researcher and corporate researchers) conducted workshops with citizens and municipalities, and field interviews to municipality, citizens, the project owners and care institutions in 2017-2018. Through collected cases, authors extracted success factors and exemplified them with two exemplified cases of the Omuta's dementia care programs.

Results

Ms. E was worried by people in her region due to her wandering behavior as she was found on the street away from her home. Her behavior was taken as dementia act and dangerous as well. This case of Ms. E showed us an importance to see her behavior from her point of view. For her, it was not wandering but enjoyable walk on familiar streets. As a person who has ownership of her life, her wandering act ought to be taken as her own way of well-being.

A co-habitation case of a woman with intellectual disability and one with dementia showed us an importance to utilize their capability at most. Supported each other, two women managed to leave hospitals and live their own life. They were never people with disabilities anymore. Although they need weak-tie at local community to get occasional support, they can live independently than ever and achieve their own well-being.

Conclusion

Based on the investigation, we suggest an open eco system Community-based Living Lab with person centered mindset to support people with dementia and people with socially challenged for safe and happy living. In this model, just as shown in the city strategy, instead of establishing a closed and secure area for people with dementia, open, independent and reciprocal community is proposed as one of the optimal strategies for future aging society. This regional management method for the aging society which achieve innovation, well-being and regional development, portrayed as Person Centered City in Omuta. With three layers of philosophy, education and co-creation, the method aims at further achievement of SDGs and sustainability in the city of Omuta.

Do ACTIVE: a promising way to keep persons with MCI active and healthy

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Introduction

Research in MCI has shown that there are moderate but beneficial effects on cognitive functions of persons with MCI related to combined intervention strategies including cognitive training, physical exercise and social engagement. Risk estimations vary highly between studies and range from 20 -35% for annual conversions rates of MCI to dementia. So far, there is not enough empirical evidence which factors are responsible for maintaining at an MCI stage. Although physical, cognitive and social activities seem to play a certain role in this prediction, clear results for developing specific preventive interventions are missing and required. The central focus in Do ACTIVE is to change every day habits using Do Something Different behaviour change technology that targets the main risk factors for developing dementia.

Objectives

1) To activate new lifestyle habits which persons with MCI can integrate in everyday living physically, cognitively and socially and which might help them better cope with their impairment, prevent further deterioration and build up a social network for later support if needed. 2) To evaluate effectiveness of the intervention in a sufficiently large group with the right tools.

Methods/approach

From a behavioural science perspective, the failure of current medical practices based on information transfer might be due to several factors, for instance the habitual nature of human behaviour but also the mismatch between intervention and the psychological characteristics of people in different stages of behaviour change. The Do ACTIVE project will implement "Do Something Different", and combine this with innovative wearable sensor tools to help people in the self-management of their health. Do Something Different aims to change habits by increasing behavioural flexibility and breaking the 'unhealthy' habits. This is accomplished by encouraging people to step out of their comfort zone.

An exploratory study design will be used where people with MCI or mild dementia will receive a new app + Do programme on their smartphone + Fitbit Versa as intervention for a period of 3 months. The Montreal Cognitive Assessment tool will be used to measure the cognitive state at 0 and 9 months later. Furthermore Quality of Life questionnaires will be used at 0, 3 months and 9

months. The outcomes will be measured within each individual person, as a group and versus findings in literature.

Results

There are no results yet, as the study is about to start at the writing of this abstract.

Discussion

It is interesting to see if this explorative study can indeed induce a sustainable change of lifestyle habits of persons with MCI and beginning dementia on the longer term. It is for debate if a control group would have been desired or subjects in this study can be their own control. Also, it has to be seen if the MOCA test is accurate enough to reliably indicate changes in cognitive impairment over a period of 9 months.

Conclusion

There is no conclusion related to the study results yet. Nevertheless, preliminary tests with 5 persons with beginning dementia, who used the Fitbit Versa and their smartphone, are very promising: people were definitely determined to change into more healthy lifestyle, f.e. by walking 10.000 steps daily. It is interesting to learn if persons with MCI can also change their habits, without being disturbed from fixed routines, which would be expected to be a of importance when deteriorating in cognitive health.

Ethics

Participants' data will be collected by means of real time monitoring and self-report and will be uploaded in a secure database. The procedures for the collection and storage of personal data will be conducted in alignment with the relevant General Data Protection Regulation. All partners will follow the relevant Advanced Encryption Standard procedures for personal password use and data encryption. Electronic data will be password protected and will be accessed only by authorised personnel.

Note

This study has been made possible thanks to a research grant of the Municipality of Bergen op Zoom (The Netherlands) and research investments by Care Organisation tanteLouise (The Netherlands).

The role of home care in the prevention of cognitive decline and frailty syndrome

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Introduction It is commonly accepted that frailty and dementia-related cognitive decline are strongly associated. However, the degree of this association is often debated, especially in homebound older adults with disabilities. Therefore, this study was aimed to investigate possible interactions of frailty on cognitive function in older adults receiving home care.

Methods A screening for frailty and cognitive function was conducted at 12 primary healthcare settings of the nationally funded program "Help at Home" in Heraklion Crete, Greece. Cognitive function and frailty were assessed using the *Montreal Cognitive Assessment* questionnaire and the *SHARE-Frailty Instrument*, respectively. *Barthel*-Activities of Daily Living and the *Charlson Comorbidity Index* were also used for the identification of independence level and comorbidity, respectively. Statistically, in order to investigate the impact of frailty on cognitive function (decline), crude linear regression models were performed, adjusting for potential confounding effects (age, gender, education, depression, comorbidity and homebound status).

Results: The mean age of the 192 participants (66% female) was 78.04 ± 8.01 years old. As expected, frailty is strongly associated with decreased cognitive function among older adults; frail (14.62, p=0.008) vs. pre-frail (16.82) vs. non-frail (19.86) and thus cognitive decline. However, a multiple linear regression revealed that this reduction on cognitive function (B'=-2.39, p=0.246) between frail and non-frail older adults was no longer significant after adjusting for depression and comorbidity. Most importantly, annual individual income (B'=2.31, p=0.005) and higher education level (B'=2.94, p=0.019) were both found as protective factors for cognitive decline progression and thus dementia development. However, depression was associated with cognitive decline regardless of socioeconomic variables. **Conclusion:** Our results suggest that health

professionals caring for frail people with cognitive impairment must focus on early recognition and management of depression.

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Using digital tool to improve long term efficacy of physical activity program in obese elderly subjects

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Name and affiliation

Federico Schena - Carlotta Chiari - University of VERONA - La Salute nel Movimento (Your Health into Movement)
A3 Functional decline and frailty - Physical Activity

Description of the commitment

Objective

The long term efficacy of weight loss program is a key problem in the management of obesity even in aged population. The aim of this study was to evaluate the effectiveness of applying a tailored physical activity prescription, implemented through smartphone, after three weeks of multidimensional rehabilitation program (MRP) in obese elderly subjects. Primary outcome of the study was the adherence to the follow up treatment program, secondary outcome the ability to reach the individual target exercise.

Methods

Forty-two obese elderly patients (age 61.9, BMI 34) were enrolled and after 3 weeks of intensive multidimensional program for weight loss, shared in three groups: 26 in control group (CG), 10 in general prescription group (GPG) and 6 in organized physical activity group (OPAG). All groups have the same general indication of daily physical activity (guideline of OMS, goal 10.000 steps per day) but CG by the usual clinical report whereas GPG and OPAG used a smartphone application called Bot Chat "CERISM+Salute" to record daily activity (GPG) or to additionally obtain personalize goal (OPAG). All subjects were evaluated after three and six months from MPR about: partecipation of follow up, anthropometric data, performance datas and answers of IPAQ questionnaire. GPG and OPAG also about: number of daily steps and daily physical activity were recorded.

Results

The adherence in follow up after three month was 69% of CG, 80% of GPG and 100% of OPAG and after six months: 50% of CG, 60% of GPG and 100% of OPAG. Global active life style measured by IPAQ questionnaire showed positive changes: all three groups increased physical activity and reduced sitting time after three months, but only OPAG further improve physical activity at the six months follow up.

Results and current status

Conclusion

The study suggests that the availability of a digital solution combined with specific feedback on physical activity, in addition to the normal features, helps even a critical population as obese elderly subjects to stay more active. This probably belongs by improving their motivation and stimulating individual skills to maintain at home the practice acquired during the intense care setting. In the long-term, this is translated into better quality of life, through management of obesity-associated morbidities and reduction of risk of frailty .

Collaborations that are welcome/needed

Any collaboration of research groups interested in the study of chronic diseases mechanisms are welcome.

Publications that came out of this commitment

This research is a very recent development of general project La salute nel Movimento. A master thesis on this topic has been already discussed and a first paper is in preparation

Effects of an Intensive Inpatient Rehabilitation Program in Elderly Patients with Obesity

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A3 Functional decline and frailty – Physical Activity

Description of the commitment

Objective

Weight lost in obese elderly person is a difficult task because of the complicate management of diet restriction and maintenance of functional capacity in the aged metabolism. *T*his study aim to assess the short-term effectiveness of an intensive inpatient multidimensional rehabilitation program (MRP), including diet, exercise, and behavioural therapy, in elderly patients with severe obesity.

Methods

Forty-four elderly subjects (old; age 69.3 ± 3.5 years, BMI 41.9 ± 14.9) were analyzed against a larger group of 215 adult subjects (adult; age 48.2 ± 18.5 years, BMI 43.9 ± 9.4), who were used as controls. All patients underwent MRP, based on group therapy guided by a multidisciplinary team (physicians, dietitians, exercise trainers, psychologists). We evaluated changes in anthropometry, cardiovascular risk factors, physical fitness, quality of life, and eating behavior.

Results: After 3 weeks of MRP, we observed a reduction in body weight (old –3.8%, adult –4.3%), BMI (old –3.9%, adult –4.4%), waist circumference (old –3.4%, adult – 4.1%), total cholesterol (old –14.0%, adult –15.0%), and fasting glucose (old –8.3%, adult –8.1%), as well as improved performance in the Six- Minute-Walk Test (old +28.7%, adult +15.3%), chair-stand test (old +24.8%, adult +26.9%), and arm-curl test (old +15.2%, adult +27.3%). Significant improvements were also registered in all other domains.

Results and current status

Conclusion

Our 3-week MRP provided significant clinical and functional improvement, which was similar between elderly and adult subjects with severe obesity. In the long-term, this may be translated into better quality of life, through better management of obesity-associated morbidities and reduced frailty.

Collaborations that are welcome/needed

Any collaboration of research groups interested in the study of chronic diseases mechanisms are welcome.

Publications that came out of this commitment

The European Journal of Obesity: Obes Facts 2019;12:199–210

Working Group for establishing a Nordic Chapter for Gerontechnology

Henning Boj Andersen

Technical University of Denmark

The International Society for Geron¬technology (ISG) defines gerontechnology as "designing tech¬nology and environment for independent living and social participation of older persons in good health, comfort and safety". A Nordic Chapter for Gerontechnology is in the process of being established, and inter¬ested researchers and practitioners are invited to join the working group.

ISG Mission

ISG encourages and promotes technological inno-vations in products and ser¬vices that address older peoples' ambitions and needs on the basis of scientific knowledge about ageing processes including cultural and individual differences.

ISG Vision

ISG works toward the realization of a society fully served by technology that is as accessible to ageing people as it is to people in younger genera¬tions.

http://www.gerontechnology.org/

Why a Nordic Chapter?

Development, implementation and use of technol¬ogies for older people raise a number of chal¬lenges to safety, quality as well as ethical issues. While most of such challenges and issues are the same across national borders, some of these vary very much from country to country. The Nordic healthcare sys¬tems, their infrastructure, payment base and not least the culture and values behind are quite similar, relative to other countries. We therefore have a shared understanding of care quality, equality and protection of dignity and privacy which form common ground on which design, implement and assess technologies for independent living.

Contact:

Working Group for Establishing a
Nordic Chapter on Gerontechnology
Henning Boje Andersen
Technical University of Denmark
Management Institute
Lyngby, Denmark
hebq@dtu.dk

First Working Group meeting:

14 May, 17:15 -18:15, DTU / AHA 2019

ISG World Conference of Gerontechnology 2020

18-20 May, 2020, Trondheim, Norway
https://www.sintef.no/ISG2020

The effect of playful exercise on functional and physical ability

Humira Ehrari, Henning Boje Andersen
Technical university of Denmark

Background

According to the world health organization's report (WHO 2009) one area of increasing focus in health is the demographic development and the life expectancy of older adults. The amount of adults aged 65+ is growing. The proportion of adults aged 65 was estimated at about 521 million in 2011 and this number is growing by 939 million by 2030 (Chodzko-Zajko et al. 2009; United Nations 215AD). The increased life expectancy imposes many challenges for the individual in terms of difficulties in daily life activities and normal functioning. Evidence from epidemiological and clinical studies shows that one of the most important approaches to improve the quality of life and healthy aging is to encourage daily physical activity among older adults. However, motivation to engage in physical activity is often low in old age. A potential method to increase physical activity may be the use of play ware technologies such as moto tiles.

Aim

This study aims to investigate the potential of moto tiles in motivating older adults to become physically active. Hence, we examine what extent playful physical exercise during a 12 week period by of older (65+) citizens improves physical and functional abilities and to what extend it is accompanied by changes in physical activities outside exercise sessions. As secondary purpose we want to determine weather changes in performance on MOTO tiles over time correlate with changes in balance and functional measures.

Method

We conduct a randomized control trial with an n=38 older mean age was 84.years (SD=7.47) and n=26 were women. The participants were randomly allocated to an intervention (n = 19) or a control group (n = 19). The intervention consisted of playful exercise to improve balance in small groups twice a week for 12 weeks. The control condition was leisure activities.

Results

Our results shows that intervention on average improved functional balance. However, the improvement is not significant p=0.11. Furthermore, there can be seen no changes in physical activities outside exercise sessions. During the 12 weeks, intervention has a mean 4159.49 steps control group has 4853.80 steps. Furthermore, no correlation between Moto sores and BBS scores are observed**.**

Conclusion

The p-value is below statistical significance for bergs balance score while the effect size is ok. Therefore, there is reason to believe that if there were more subjects, a significant effect would be seen. The analysis has 80% power, alpha of 0.05, and an average difference of 3 points in change score (SD = 5) between the intervention group and the control group. The analysis indicated that we should include at least 45 participants in each group, to show a statistically significant difference.

References

Chodzko-Zajko, W. J., Proctor, D. N., Fiatarone Singh, M. A., Minson, C. T., Nigg, C. R., Salem, G. J., and Skinner, J. S. 2009. "Exercise and Physical Activity for Older Adults," *Medicine and Science in Sports and Exercise*, pp. 1510–1530.

United Nations. 215AD. "Department of Economic and Social Affairs, Population Division (2015) World Population Ageing (ST/ESA/SER.A/390)."

WHO. 2009. "Global Health Risks: Mortality and Burden of Disease Attributable to Selected Major Risks," *Bulletin of the World Health Organization* (87), pp. 646–646.

Criterion validity for step counting in four consumer-grade physical activity monitors among older adults with and without rollators

Rasmus Tolstrup Larsen
The University of Copenhagen

Background

Few studies have investigated the measurement properties of consumer-grade physical activity monitors (PAMs) in older adults. Therefore, we investigated the criterion validity of consumer grade PAMs in older adults and whether the measurement properties differed between older adults with and without rollators and whether worn on the hip or at the wrist.

Methods

Consumer-grade PAMs were eligible for inclusion in this study if they: 1) could be fastened at the hip as well as on the wrist, 2) were simple in function and design and thus easy to use for participant with minimal technical skills, 3) included only step-counting as outcome measure and 4) were powered by a button cell battery. Participants performed self-paced walking for six minutes while two physiotherapists counted their steps with a click-counter. The average of the two counts was used as criterion. The participants wore 16 monitors, four located bilaterally on both hips and wrists. Our prior expectation was that all monitors would have at least moderate criterion validity for all participants, good criterion validity for participants walking without a rollator and poor criterion validity for participants walking with a rollator.

Results

Four PAMs were included in this study; Misfit Shine, Nokia GO, Jawbone UP Move and Garmin Vivofit 3. A total of 103 older adults participated. One type of PAM was excluded from this study due to technical issues. Therefore, we present results on the frequency of data loss, ICC(2,1) and percentage measurement error for three different PAMs located on four different positions.

Conclusions

The hip-worn PAMs did not differ significantly in terms of measurement error or criterion validity. Wrist-worn monitors cannot adequately measure number of steps in a population of older adults using rollators. The hip-worn PAMs were superior to wrist-worn PAMs among older adults with and without rollators.

Book of Abstract: Conference on active and healthy ageing,

14-16 May 2019,

Copenhagen, Denmark

Technical University of Denmark
Department of Management
Healthcare Management Group
Diplomvej 372 DK 2800
Kongens Lyngby Denmark
ISBN: 9788793458642

Appendix VI – REACH demo and marketing symposium and exhibition in Copenhagen

REACH 2020 EXHIBITION

RESPONSIVE ENGAGEMENT OF THE ELDERLY
PROMOTING ACTIVITY AND CUSTOMIZED HEALTHCARE

REACH 2020

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 690425.

The REACH Project

REACH represents a solution that seeks to prevent older citizens from loss of function and decline as a major effect of physical inactivity.
The REACH system turns clinical and care environments such as homes and everyday life, day care centres and other geriatric facilities into highly personalised and data-driven early intervention systems that engage older persons in preventative and rehabilitative activity (primarily physical activity but also with regard to cognitive, mobility, social and nutritional aspects). REACH achieves its objectives through an integrated sensing-monitoring-intervention chain that is exemplarily and iteratively adapted in the project to the ecosystems of a series of care settings for older persons (represented exemplarily through four different use case settings).

Introduction to the REACH Exhibition

In this booklet we have summarized the solutions presented by the REACH 2020 consortium. This exhibition is divided into two main parts. In Part 1 we will show the solutions developed for the home and community centre contexts. In Part 2 we will show the solutions developed for the hospital and revalidation centre contexts.

Exhibition Part A Context: **Community Care**

Conference on

Active and Healthy Ageing 2019

14-16 May 2019, Technical University of Denmark

EXHIBITION CATALOG

Exhibition open: 15 May 10.00-17:45
Danmarks Tekniske Universitet, Oticon-salen
Studentertorvet Bygning 107, Kgs. Lyngby

Exhibition of the Conference on Active and Healthy Ageing 2019

The Exhibition of the Conference on Active and Healthy Ageing 2019 has invited developers, suppliers and service providers to show-case their solutions within the themes of the conference: Approaches, technologies and services to support of active and healthy aging.

We invite citizens, care professionals and developers to visit the exhibition and view solutions for prevention, rehabilitation, empowerment of and care for older adults.

This catalog of exhibitor contain the 1-pagers supplied by each exhibitor.

The Exhibition is organized by the Danish Healthtech Innovation Network (www.welfaretech.dk/projekter/danish-healthtech) and EU Horizon project REACH (www.reach2020.eu)

Editors and organisers:
Julie Skajaa Wøldike (DTU)
Julie Justi Andreasen (Danish Healthtech)
Annette Rye Larsen (Danish Healthtech / DTU)
Sophie Krog Agergaard (DTU)
Henning Boje Andersen (DTU)

Conference co-organized by:
REACH2020: http://reach2020.eu
EIP AHA A3 & C2: https://ec.europa.eu/eip/ageing/actiongroup/index/a3_en
Danish Healthtech: https://www.welfaretech.dk/projekter/danish-healthtech Copenhagen Health Innovation:https://copenhagenhealthinnovation.dk/

Published: 2019
Photos: Colourbox; Playware;
Print: Vester Kopi 2019

List of Exhibitors

Abrace ApS
AL Engineering A/S
AVDAN A/S
Brane ApS
Cekura A/S
DDSI
DoseSystem ApS
G4S Care Technology
Imaginary
InCare Systems A/S
Life Sceince Robotics
Moblos Aps
Oliz
Rehaps
RotoBed
Safevent / Safegranny
SENS motion
Tele Call ApS
Trone Danmark
University College Absalon

REACH Partners

REACH introduction
Technical University of Munich
Chair of Building Realisation and Robotics
Alreh Medical
Eindhoven University of Technology
Philips Design
GUIDEN65
Ontmoet en Groet
EPFL
Technical University of Denmark
Biozoon
DoseSystem ApS
Fraunhofer IAIS
Geneva University Hospital (HUG)
Hospitals
University of Copenhagen
Moto Tiles
SmartCardia SA
ArjoHuntleigh Getinge Group

15 May 2019 – Exhibition at the Conference on Active and Healthy Ageing 2019

Conferencemanager.dk/AHA2019

Company name / project name	Project Picture
REACH2020: Responsive Engagement of the Elderly promoting Activity and Customized Healthcare - a Horizon 2020 Project (grant agreement No 690425): in the European consortium with 17 partners from higher education institutions and industry, the four EuroTech Universities along with the industry partners build the core of this project. The total grant received amounts around 6 Million Euros.	
What will we show at our exhibition stand?	
The REACH system turns clinical and care environments such as homes and everyday life, day care centers, and other geriatric facilities into highly personalized and data-driven early intervention systems that engage older persons in preventative and rehabilitative activity. Details and backgrounds about the project can be found on http://reach2020.eu	
What differentiates us?	
REACH represents a solution that seeks to prevent older citizens from loss of function and a decline as a major cause of physical inactivity. REACH achieves its objectives through an integrated sensing-monitoring-intervention chain that is in the project exemplarily and iteratively adapted to the ecosystems of a series of care settings for older persons. A unique feature of REACH is the integrated utilization of personalized behavior change and engagement techniques informing the development of the toolkit elements (sensors, interfaces, devices, etc.). REACH's implements a combination of wearable and ambient sensors for each Touchpoint along with a set of co-adapted Machine Learning elements. Personalized Intelligent Interior Units (PI²Us) are used to integrate the above described functional elements physically and seamlessly into daily life in the different target use case settings.	
What do we look for at the exhibition?	
Customers: clinical and care environments such as homes and everyday life, day care centers, and other geriatric facilities	
Contact data	
Dr.-Ing. Thomas Linner, Scientific Director & Project Manager thomas.linner@br2.ar.tum.de	

Danish Healthtech is co-financed by the Danish Ministry of Higher Education and Science and The European Regional Development Fund

REACH (Responsive Engagement of the Elderly promoting Activity and Customized Healthcare) has received funding from the European Union's Horizon 2020 research and innovation programme www.reach2020.eu

Danish Healthtech

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Conferencemanager.dk/AHA2019

REACH 2020

Company name / project name	Company logo
Company name: ALreh Medical *Project name: A personal mobility device for elderly physical rehabilitation, REACH Touchpoint 1*	iStander BY ALREH MEDICAL
What will we show at our exhibition stand?	**Project Picture**
We will present a personal mobility device for elderly physical rehabilitation at the hospital/care home: The intervention consists of a mobility device called iStander developed by Alreh Medical with the removable base of support which enables patient for a short walk, that is coupled with serious rehab games and a Kinect sensor.	

What differentiates us?

This intervention aims at strengthening the physical and functional capacities of hospitalized elderly patients. Furthermore, a simultaneous combination of physical and cognitive exercises which the device makes possible is the most effective tool in rehabilitation of elderly. After leaving the hospital the patient continues the rehabilitation and activation at home with help of the equipment building on the good training habits established during both hospital and home rehabilitation. Our features: 1) addressed to hospitalized seniors (medium and poor condition), 2) multifunctional: activation, rehabilitation, mobility, bed assistive functions (transfer, mobility), 3) modular: exchangeable components of the system according to physical and mental health condition, and 4) selection of appropriate modules of the device by physiotherapeutic staff of the hospital will allow to educate a patient how to operate it and develop personal training programs.

What do we look for at the exhibition?

Feedback from potential users as well as sharing of experience with similar implementation; Financing; a place to test our product; a collaboration partner

Contact data

Company name: Alreh Medical
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Conferencemanager.dk/AHA2019

REACH 2020

Company name / project name	Company logo
Company name: Biozoon GmbH *Project name: Personalised food + 3D food printer, REACH Touchpoint 3*	food innovations gmbh biozoon.
What will we show at our exhibition stand?	**Project Picture**
Biozoon will present the most innovative solution for the management of people suffering from eating difficulties such as mastication and swallowing disorders. Therefore, the visitors of our stand will receive: • *Insights into Biozoon's main results of the REACH project* • *Tasting of the developed smoothbread* • *Exhibition of the 3D food printer used within REACH project* • *Contents of the smoothfood concept*	

What differentiates us?

BIOZOON is a well-recognized company for its innovative products and strong involvement within the area of personalized nutrition for elderly, being also the market leader in the field of processed texturizers for the gastronomy, catering, canteen kitchen as well as for private consumers. BIOZOON is developer of smoothfood which focuses on products for the frail and elderly with difficulty in chewing and swallowing who live at home or in nursing facilities.

What do we look for at the exhibition?

Biozoon is going to use this exhibition to:

- *Reach out to an international market*
- *Meet new potential clients and increase sales*
- *Demonstrate our products and services*
- *Provide a launch pad for our products and innovation*
- *Raise brand awareness and increase visibility in the marketplace*
- *Strengthen business relationships in a face-to-face environment*
- *Stay updated with the industry*
- *Network and make new industry contacts*

Contact data

Company name: Biozoon GmbH (HRB 3474 BHV) Contact person's name and title: M.Sc. Ann-Kristin Schwarze (F)
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Telephone: 0049 471 92928515
E-mail : Schwarze@biozoon.de

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REACH 2020

Company name / project name	Company logo
Company name: University of Copenhagen, Department of Public Health, Section of Social Medicine *Project name: Showcasing various activity trackers, REACH Touchpoint 4*	
What will we show at our exhibition stand?	**Project Picture**
We will present a "poster" with the title: Validity problems with step counting and physical activity monitoring in older adults	

What differentiates us?

We will show different wearable monitors suitable for older adults and then we will present out main findings from out study with 103 participants.

What do we look for at the exhibition?

We would like to address the problem with low validity in wearable monitors.

Contact data

Company name: University of Copenhagen
Contact person's name and title: Rasmus Tolstrup Larsen and Christoffer Bruun Korfitsen
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REACH 2020

Company name / project name	Company logo
Company name: Fraunhofer IAIS *Project name: Activity Recognition Demo, REACH Touchpoint 2*	Fraunhofer IAIS
What will we show at our exhibition stand?	**Project Picture**
We will show how activities of daily living can be recognized from body worn sensors data. *Our idea is to use Machine Learning for modelling the daily habits of a patient, with the aim of detecting any possible deterioration of its overall health condition.*	

What differentiates us?

Our activity recognition system can be adapted to the profile of a patient and his personal routines and preferences. Moreover the system does not rely on video recordings, which reduces the pervasiveness of the system and increases the privacy and trust of the patient.

What do we look for at the exhibition?

We are looking forward to present the actual state of our system, focused on recognizing a small and predefined selection of activities on any person who wants to participate.

Furthermore, we want to connect with possible collaboration partners and users.

Contact data

Company name: Fraunhofer IAIS
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E-mail: lisa.schrader@iais.fraunhofer.de

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REACH 2020

Company name / project name	Company logo
Company name: TU/e, Philips Design, Ontmoet en Groet and EPFL *Project name: HealthyTogether + Behavior Change / Machine Learning showcasing, REACH Touchpoint 3*	TU/e Technische Universiteit Eindhoven University of Technology; Ontmoet & Groet; PHILIPS; EPFL
What will we show at our exhibition stand?	**Project Picture**
We will demonstrate the REACHHealthyTogether application and the accompanying back-end and resulting analysis of the effects of behaviour change strategies. The REACHHealthyTogether application is a tool to investigate different behaviour change strategies. This application was designed with a panel of senior end users to track their physical activity in terms of steps taken a day. It also allows participants to collaborate to reach a combined daily activity goal.	
What differentiates us?	
This application was design with senior citizens for seniors, for ease of use. Motivating a healthy amount of physical activity is very beneficial to promoting good health and that is what this application aims to do.	
What do we look for at the exhibition?	
At the exhibition we look to promote and present our work to inspire and receive valuable feedback from a wider audience.	
Contact data	
Company name: Eindhoven University of Technology Contact person's name and title: Carlijn Valk, PhD candidate Address: PO Box 513, 5600 MB Eindhoven, the Netherlands Telephone: +31 640821583 E-mail: c.a.l.valk@tue.nl	

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REACH 2020

Company name / project name	Company logo
Company name: Geneva University Hospitals + ALreh Medical *Project name: A personal mobility device for elderly physical rehabilitation, REACH Touchpoint 1*	HUG Hôpitaux Universitaires Genève; activLife BY ALREH MEDICAL
What will we show at our exhibition stand?	**Project Picture**
We will present a personal mobility device for elderly physical rehabilitation and activation: The intervention consists of a mobility device called activLife developed by Alreh Medical, that is coupled with serious rehabilitation games, a Kinect sensor and a wearable sensor called Stepwatch, to continuously measure the patients' physical activity.	
What differentiates us?	
The hospital-to-home transition is increasingly recognized as a critical period in the patient care, during which different incidents can occur and induce frequent re-hospitalization. This intervention aims at strengthening the physical and functional capacities of hospitalized elderly patients to prevent re-hospitalization. Furthermore, a simultaneous combination of physical and cognitive exercises which the device makes possible is the most effective tool in prevention and rehabilitation of elderly outside the hospital. Versatility of the system with broad customization possibilities and vast library of exercise training programs allows activLife system to be a very valuable tool in the activation process of elderly and geriatric patients.	
What do we look for at the exhibition?	
Feedback from potential users as well as sharing of experience with similar implementation; financing; a place to test our product (activLife); a collaboration partner	
Contact data	
Company name: Geneva University Hospital (HUG) + Alreh Medical Contact person's name and title: Caroline Perrin + Dr. Dominika Kozak Address: Campus Biotech, Chemin des Mines 9, 1202 Geneva + Filtrowa 81/27, 02-032 Warsaw, Poland Telephone: +41 787997725 + +48 534279488 E-mail: caroline.Perrin@hcuge.ch + dominika.kozak@alreh.pl	

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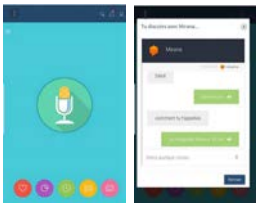
REACH 2020

Company name / project name	Company logo
Company name: Geneva University Hospitals (HUG) *Project name: MiranaBot Touchpoint 3*	HUG Hôpitaux Universitaires Genève
What will we show at our exhibition stand?	**Project Picture**
We will show a conversational agent with a hybrid user interface to promote healthy eating *Despite the extensive research and the large number of existing nutrition applications, food recommender systems are still facing many challenges in terms of nutrition habits tracking and delivery of the proper recommendations* *We have developed a conversational agent called "MiranaBot", where the goal is to help the user to be aware of their eating habits in terms of variety and regularity. Rather than focusing of food quantity and nutritional value, the system targets the variety of the individuals' diet.*	
What differentiates us?	
The nutrition habits tracking via voice interaction, the natural conversation, and personalized feedback given by the system makes our solution unique. Visitors would want to interact and try to understand how the system works.	
What do we look for at the exhibition?	
A place to test our product; advices and feedbacks to improve the system; a collaboration partner; financing.	
Contact data	
Company name: HUG (University Hospital of Geneva) Contact person's name and title: Mirana Randriambelonoro Address: Chemin des Mines 9, 1202 Genève Telephone: +41 78 906 33 86 E-mail: mirana.randriambelonoro@etu.unige.ch / MiranaMichelle.Randriambelonoro@hcuge.ch	

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REACH 2020

Company name / project name	Company logo
Company name: Moto Tiles, Technical University of Denmark *Project name: Playful Body and Brain Test with the Moto Tiles, REACH Touchpoint 4*	moto tiles bring happiness to life
What will we show at our exhibition stand?	**Project Picture**
Traditional early detections of aging and related diseases are usually complicated and require professionals to conduct them. We developed the Moto Body & Brain test, which can measure a person's physical and cognitive abilities in a relaxing environment with only 3 to 5 minutes.	
What differentiates us?	
The Moto Tiles are designed based on the concept "Anybody, Anywhere, and Anytime". At our stand, visitors will see how easy to use the Moto Tiles as they will have chance to experience the unique Moto Body & Brain test by themselves. Also they will have a glance of the Moto training and see how the Moto test and training are integrated as a one-stop solution.	
What do we look for at the exhibition?	
Potential partners and customers	
Contact data	
Company name: Technical University of Denmark Prof. Henrik Hautop Lund Address: Building 326, Technical University of Denmark, 2800 Kgs. Lyngby Email: hhl@playware.dtu.dk www.moto-tiles.com	

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REACH 2020

Company name / project name	Company logo
Company name: SmartCardia SA *Project name: Medical-grade wearable demo, REACH Touchpoint 2*	SmartCardia
What will we show at our exhibition stand?	**Project Picture**
We will show a demo of our wearable elderly monitoring patch solution. *Monitoring vital signs of elderly in a continuous and easy to use manner allows for early intervention in case of abnormal health conditions. SmartCardia's wearable patch allows for measuring vitals (ECG, respiration, SpO2, activity) of elderly from a chest patch.*	

What differentiates us?

SmartCardia's solution can be used in a variety of different settings: people can use them for health monitoring with data sent to their mobile phones, elderly and patients can be monitored remotely by clinicians and hospital staff as well. In the stand, attendees can check their health status by using our patches.

What do we look for at the exhibition?

We are looking for potential customers (patient groups, clinicians/hospitals), collaboration partners in the healthcare space, partners willing to explore different application scenarios.

Contact data

Company name:	SmartCardia SA
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E-mail:	srinivasan.murali@smartcardia.com

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Danish Healthtech

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Conferencemanager.dk/AHA2019

REACH 2020

Company name / project name	Company logo
Company name: Chair of Building Realisation and Robotics, Technical University of Munich + ArjoHuntleigh Getinge Group *Project name: Multifunctional bed and integrated sensors demo, REACH Touchpoint 2*	Technical University of Munich, br2, ARJOHUNTLEIGH GETINGE GROUP
What will we show at our exhibition stand?	**Project Picture**
This exhibit demonstrates a real-time In-bed monitoring system, targeting heart activity, breath frequency and micro mobility monitoring. *This smart bed also called as PI²U-Bed, is the second version of this prototype which is underdevelopment in a cooperation between Arjo and TUM. The Sara Combilizer from Arjo, simplifies the mobility of the patients and the integrated sensors from TUM targets monitoring aspects.*	

What differentiates us?

Fusing different data collecting sensors in a modular way to monitor immobile elderly citizens in the bed. Furthermore, mounting all these monitoring methods on a mobilizer bed. A smart furniture called PI²U-Bed.

What do we look for at the exhibition?

We are looking for future collaboration with furniture designers and marketing teams in order to develop a product for the market. Furthermore, due to the nature of this prototyped, which targets supporting nurses and medical staff with real-time data, future cooperation with hospitals and health care centers is of high interest for future implementation and testing.

Contact data

Company name:	*Chair of Building Realisation and Robotics (TU Munich)*
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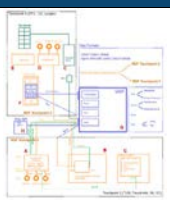
Danish Healthtech

15 May 2019 – Exhibition at the Conference on Active and Healthy Ageing 2019

Conferencemanager.dk/AHA2019

REACH 2020

Company name / project name	Company logo
Company name: Technical University of Munich (TUM) + Technical University of Denmark (DTU) + Philips *Project name: Laptop based demo of data platforms (CARP, HSDP), REACH Touchpoint 2 & 4*	Technical University of Munich, br2, Technical University of Denmark, DTU, PHILIPS
What will we show at our exhibition stand?	**Project Picture**
We will show the first integration steps taken up to now, in order to integrate the CARP Cachet platform with REACH prototypes. *The prototypes forward raw data to the local server.* *This server can forward or request data to or from the CARP Cachet platform.* *This exhibits the first step of REACH Engine and data collection integration, a simple GUI for selecting the files and raw data collection is implemented.*	

What differentiates us?

The initial step taken and presented in this exhibit can lead to a giant leap for a centralized health care data management system which is called "REACH Engine" in the context of the REACH Project. The fully implemented features include: safe and secure data communication and storage, centralized data management, sophisticated data analysis algorithms running on the background for prevention and early detection aspects.

What do we look for at the exhibition?

We are looking for future collaboration with hospitals and health care centers. Furthermore, cooperation with technology developers in the field of "Ambient Assisted Living" is highly needed.

Contact data

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REACH 2020

Company name / project name	Company logo
Company name: Chair of Building Realisation and Robotics, Technical University of Munich *Project name: Personalized Intelligent Interior Unit Demo (MiniArc), REACH Touchpoint 2 & 4*	Technical University of Munich, br2
What will we show at our exhibition stand?	**Project Picture**
In this exhibit, we demonstrate a new approach for increasing activity level and motivation among the elderly. *An interactive approach which supports elderly citizen to use and adapt new technologies. This module can be used as the main user interface for all REACH prototypes, due to the fact that most of the sensors are integrated to present their data on this interface. This interface is designed to be highly adaptable to existing furniture at seniors' homes.*	 REACH Satellite Concept

What differentiates us?

A modular and centralized unit for the elderly in order to improve physical and mental activity, motivation and monitoring, this is implemented via approaches such as gaming and training. A smart furniture called PI2U-MiniArc.

What do we look for at the exhibition?

We are looking for future collaboration with furniture designers and marketing teams in order to develop a product for the market. Furthermore, future cooperation with hospitals and health care centers is also highly required for implementation and testing.

Contact data

Company name:	*Chair of Building Realization and Robotics (TU Munich)*
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REACH 2020

Company name / project name	Company logo
Company name: REACH2020 *Project name: REACH Touchpoint 1 - Personal mobility device*	ALREH MEDICAL, HUG, TUM, TU/e Technische Universiteit Eindhoven University of Technology
What will we show at our exhibition stand?	**Project Picture**
In Touchpoint 1, the REACH system enables older adults to prolong their time living independently through cost efficient, highly engaging, and safe community-integrated exercise technology. Specifically, the REACH system increases and maintains cardiopulmonary health (aerobic fitness), balance (and reduce risk of falls through target-oriented muscle strengthening activity), and cognitive fitness.	

What differentiates us?

By using additional sensing wearables (HR monitoring, activity tracker, activLife solution), Touchpoint 1 provides valuable data for monitoring and early detection signs of physical decline among elderly. We propose activLife intervention concept which integrate the sensing-monitoring, analyzing and personalizing of the intervention. The element of activating training programs in a form of computer games is significant while motivating seniors to activity.

What do we look for at the exhibition?

Financing opportunity; facilities to test our product; a collaboration partner; customer interest from the elderly community; researcher who can assist us with future research collaboration; we look for advice about how to improve our system/technology

Contact data

Company name: Alreh Medical
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REACH 2020

Company name / project name	Company logo
Company name: REACH2020 *Project name: REACH Touchpoint 2 - Active Environment*	TUM, SCHÖN KLINIK, arjo, Fraunhofer IAIS, SmartCardia
What will we show at our exhibition stand?	**Project Picture**
In Touchpoint 2, the REACH system enables patients to reduce the duration of their hospitalisation, reduce decline after discharge, reduce risk of readmission, and be able to perform their ADL with reduced support from professional caregivers.	

What differentiates us?

In Touchpoint 2, the personalized intelligent interior units are developed by using a series of sensing technology which is considered as a special type of smart furniture that integrates the REACH engine concepts by monitoring patients' biometric signals. Based on analyzed data we propose the intervention concept which will help patients to reduce the duration of their hospitalization, decline after discharge and risk of readmission.

What do we look for at the exhibition?

Financing opportunity; facilities to test our product; a collaboration partner; customer interest from the elderly community; researcher who can assist us with future research collaboration; we look for advice about how to improve our system/technology.

Contact data

Company name: Chair of Building Realization and Robotics, Technical University of Munich
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REACH 2020

Company name / project name	Company logo
Company name: REACH2020 *Project name: REACH Touchpoint 3 – Socializing & Nutritional Monitoring*	TU/e, PHILIPS, biozoon, HUG Hôpitaux Universitaires Genève, CPRL, Connect Ageing
What will we show at our exhibition stand?	**Project Picture**
In Touchpoint 3, the REACH system enables older adults to improve their nutritional intake and their level of physical activity through social engagement and community participation.	

What differentiates us?

Touchpoint 3 uses both quantitative and qualitative methods to monitor, analyze and collect data through different medium in order to be able to offer a personalize improvement for the nutritional intakes and level of physical and social activity for elderly by allowing them to self-report their nutritional intake and motivate them to engage in more physical and social activities.

What do we look for at the exhibition?

Financing opportunity; facilities to test our product; a collaboration partner; customer interest from the elderly community; researcher who can assist us with future research collaboration; we look for advice about how to improve our system/technology.

Contact data

Company name: Eindhoven University of Technology
Contact person's name and title: Prof. Dr. Yuan Lu
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REACH 2020

Company name / project name	Company logo
Company name: REACH2020 *Project name: REACH Touchpoint 4 - Gaming and Training*	Lyngby Taarbæk Kommune, Technical University of Denmark, DTU, SENS
What will we show at our exhibition stand?	**Project Picture**
In Touchpoint 4, The REACH system enables early detection of critical changes in physical activity of older adults, either short-term or long-term changes, and supports increased physical activity through individualized motivational strategies and playful social or solitary activities.	

What differentiates us?

In Touchpoint 4, we propose co-creative environments that encourage older adults toward more active life by monitoring and analysing their current activities and improve it by ensuring a convenient and easy way of estimating the change in their physical activities.

What do we look for at the exhibition?

Financing opportunity; facilities to test our product; a collaboration partner; customer interest from the elderly community; researcher who can assist us with future research collaboration; we look for advice about how to improve our system/technology.

Contact data

Company name: Technical University of Denmark
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Danish Healthtech
DoseSystem ApS

15 May 2019 – Exhibition at the Conference on Active and Healthy Ageing 2019

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Company name / project name	Company logo
DoseSystem ApS	DoseSystem

What will we show at our exhibition stand?	Project Picture
DoseSystem – Medicine on time is a simple system that increases adherence and ensures medication on time. It provides support for the citizen, insight for the staff and peace of mind for the relatives. Today, DoseSystem helps citizens and staff in almost half of all Danish municipalities and in 7 countries.	

What differentiates us?

DoseCans from DoseSystem is an electronic reminder for dose packaged medicine or pill boxes. With beeping and blinking funktions DoseCan reminds us when the medicatlon should be takan and makes it possible to monitor many drug users simultaneously. If the Ok-button is not pressed on the DoseCan the back-up is activated automatically.

and of great interest? Why will visitors want to visit our stand?

We are looking for sales channels in Germany. Partners, Pharmacists and Affiliates, who can see the need and help their clients / patients and relatives with a simple and inexpensive solution, on a major issue.

Contact data

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Company name / project name	Company logo
Trone Danmark APS	TroneDanmark

What will we show at our exhibition stand?	Project Picture
GyngeStole med liniær gyngning hvor skamlen ginger med.	

What differentiates us?

Trone gyngestolen er ideel til plejehjem, sanse rum, psykiatrien, velværeaktivitet, hospitaler og dagligstuen. Det er dokumenteret at den lineære vuggende gyngebevægelse, er god for blodomløbet, samt virker beroligende eller aktiverende på brugeren. Den vuggende bevægelser stimulere samtidig brugerens balance. Trone gyngestolen er lavet så den nemt og enkelt kan betjenes. Ryglænet justeres nemt så det passer til brugerens foretrukne siddestilling. Gynge mekanismen har en nem betjent lås, som kan aktiveres, hvis stolen ikke

Alt efter behov, kan stolen være med til at forbedre livskvalitet, skaber ro/velvære, afstresning af muskler, forbedre blodomløb, stimulere sanser og for de fleste handicappede brugere fysisk eller psykisk, kan stolen betyde øget og bedre mæthed for nødvendige sanseindtryk, større tilfredshed, mere ro, glæde, velvære o.s.v. og følelsen af at kunne noget. Vi vil gerne have at folk får øje på de små ting der kan gøre en kæmpe forskel.

Contact data

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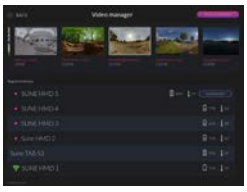
Company name / project name	Company logo
WeeSoft	Weesoft

What will we show at our exhibition stand?	Project Picture
We have developed a unique VR Content distribution platform for treatment of dementia WE TAKE AWAY 1. LONELYLESS 2. SOLITUDE 3. SAMENESS WE HELP 1. EASIER LIFE FOR CARE TAKER 2. GET NEW EXPERIENCES FOR ELDERS 3. TO HELP MORE ELDERS 4. INCREASE QUALITY OF LIFE	

What differentiates us?

Unique: We give multiple users the possibility to share VR experiences and talk to the Care Takers about them live.

Unique: We can track and do data mining on the objects of interest in the VR universe.

What do we look for at the exhibition?

We look for:
1. Partners
2. Customers
3. Financing

Contact data

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Company name / project name	Company logo
ABRACE ApS – we wish to increase quality of life through a combination of sensory stimulation, safety and aesthetic designs.	ABRACE

What will we show at our exhibition stand?	Project Picture
At our stand, we will be presenting our ABRACE Relax-product line as well as our new ABRACE Poncho and Hugging Pillow. All our products are developed to calm body and mind. Through sensory stimulation the products have a calming and relaxing effect on adults and children, who struggle with psychological challenges. In ABRACE ApS, we focus on lowering the stigmatization and create the feeling of using ordinary products, which can be used as a natural part of the everyday life.	 *ABRACE Relax and ABRACE Poncho*

What differentiates us?

In ABRACE ApS, we embrace the individual need, care for the wellbeing and strive to create better quality of life through functional and aesthetic designs. The uniqueness in ABRACE is not the individual elements – both sensory stimulation, aesthetic designs and safety are well-known within the healthcare sector – the unique thing about our products is the combination of the three components.

The aesthetic designs make ABRACE-products suitable to place within any environment, without it standing out as remedies. We find this very essential that stigmatization shall not affect the desire of increasing one's quality of

What do we look for at the exhibition?

We want to present our products to the healthcare sector, focusing on new market relations from e.g. psychiatry and other organizations in the healthcare sector.

Contact data

Company name + CVR: ABRACE ApS, CVR: 39 36 56 42
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Company name / project name	Company logo
AL Engineering A/S www.al-engineering.dk	AL Engineering
What will we show at our exhibition stand?	**Project Picture**
We will show and demonstrate a ready to use, paper less web based QMS solutions that support Medical device industry (start ups, small, medium size) in being in compliance with the regulations and standards that is essential for being allowed to produce and sell medical devices to the market.	
What differentiates us?	
The platform offers a flexible organization management system, with ready to use Know- How sets allowing for fast deployment in an organization, electronic documentation, unique social media elements, and the ability to include attachments and templates. It has a built-in process editor, and includes on line training. It supports defining, roles, automatic organization compliance report, send automatic notifications and share Information about contexts and normative sources.	
What do we look for at the exhibition?	
Contact with Medical device producers (start ups, small, medium size)	
Contact data	
AL Engineering A/S: 25730011 Tina Linders COO/BDM Tuse Næs Vej 7C 29 13 24 45 tlin@al-engineering.dk	

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Company name / project name	Company logo
AVDAN A/S, Stimuli Room CalmViso	AVDAN®
What will we show at our exhibition stand?	**Project Picture**
Stimuli Room CalmViso is an AV-environment that combines light, sound and picture including content of 100 films produced specially for people with dimensia or brain damage. Stimuli Room CalmViso is a total experience that makes people calm and sometimes talk again when they see basic things they can relate to.	
What differentiates us?	
The total solution of Stimuli Room CalmViso including the range of specially produced films is what makes CalmViso unique and "one of a kind". The content has been tested and changed several times before the result of today. At our stand it is possible to experience, see and try the Stimuli Room CalmViso. See the different films and talk to our staff about references and results of working with this unique solution within health care.	
What do we look for at the exhibition?	
It is possible to test the Stimuli Room CalmViso in your own environment, or we can visit references that have worked with the solution for a longer period. We can advise financing/leasing.	
Contact data	
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Company name / project name	Company logo
BRANE	BRANE
What will we show at our exhibition stand?	**Project Picture**
A solution, DEMOS-10, for improving care of people with dementia. DEMOS-10 provide detailed information of the activities of a person, by recording his/her circadian rhythm for a week using a sensor in a patch applied to the person's back. The data give caretakers insight to activities and rest/sleeping patterns and clarify if adjustment in care is needed.	
What differentiates us?	
Today caretakers make individual observations when they are together with the person with dementia and documents these observations in a text form. DEMOS-10 records the data continuously for a week and analyses the data automatically and show the circadian rhythm for a week on one page. The objective and automatic harvest data improve the caretakes knowledge and reduce their workload.	
What do we look for at the exhibition?	
Care homes for people with dementia and caretakers who look for new tools to improve dementia care. Research partners, who do research in sleep behavior and circadian rhythm of elderly people or patients with chronical diseases.	
Contact data	
Company name : BRANE ApS 38552740 Contact person's name and title: Jens Branebjerg, CEO Address: Stumpedyssevej 9, 2970, Hørsholm, Denamrk Telephone: +45 5376 1009 E-mail : jb@brane.life	

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Company name / project name	Company logo
G4S Care Technology and 9solutions	G4S Care Technology
What will we show at our exhibition stand?	**Project Picture**
9solutions is a leading provider of indoor location based safety, communications and smart care solutions for primarily hospitals, care homes and for home care, and personal safety. Offering includes eg care phones, nurse call, locating, activity monitoring and access control. Our solutions enable our customers to provide secure, safe and quality care.	
What differentiates us?	
We offer increased real-time situational awareness, based on real-time indoor locating and Intelligent Operational Management – All information is real-time, on-demand and analyzed/comparable. Our system is wireless and cloud-based which implies eg that our customers have the latest software at all times. What you buy today is the latest software everyday in perpetuity.	
What do we look for at the exhibition?	
We want to i) increase the awareness of our company, it's products and joint cooperation between 9solutions and G4S (in Denmark), ii) identify potential customers in Denmark within the chosen market segments and iii) identify potential cooperation partners (resellers and/or installation/maintenance) outside Denmark.	
Contact data	
Company name : G4S Care Technology; CVR: 26 89 12 80 Contact person's name and title: Lars Bo nielsen, Sales Specialist/BDM Address: Roskildevej 157, 2620 Albertslund Telephone: +45 40434029 E-mail: lars.b.nielsen@dk.g4s.com	

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Company name / project name	Company logo
CEKURA A/S / Improving life for social vulnerable people.	
What will we show at our exhibition stand?	**Project Picture**
Methods and technology to improve life for social vulnerable people e.g. reducing anxiety, helping with day rhytm, etc. We satisfy the need of be able to stay in own home and be more independent despite a mental disease. We have developed a service, that both helps reducing some of the consequences of having a mental disease, and a motivation system for doing daily task. The effects are documented in a report, which has been published and Which we will show on the event	
What differentiates us?	
We combine technology with "a human face". That means that means that our technology makes the frames, while our service makes the connection to people. The solution has documented positive effects on the daily life people with anxiety, depression and PTSD.	
What do we look for at the exhibition?	
We are looking for municipalities that are interested in doing a larger scale project with our solution. We are also looking for companies which technology can be combined with our service.	
Contact data	
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Company name / project name	Company logo
Data- & Designdrevet Sundhedsinnovation Data-& Design-driven Health Innovation	
What will we show at our exhibition stand?	**Project Picture**
The Data and Design-driven Health Innovation project aims to create innovative commercial solutions to key challenges in the health and welfare areas - national and international. The Danish healthcare system experiences a number of new and major challenges in their daily work - which are also experienced globally. It reflects a market need for new solutions that can be tackled by innovative small and medium-sized companies in Region Zealand and Greater Copenhagen.	*Partners:*
What differentiates us?	
The project offers opportunities for smv's to elaborate their ideas, products and business cases. The innovation process can be based on Danish health data (various types of descriptions of the health of citizens, which the project can provide). Processed by Cumuli Design Lab with design thinking and design tools and in collaboration with knowledge institutions, DTU and University College Absalon, where researchers and associate professors contribute to the companies' prototype development with specific knowledge contributions.	
What do we look for at the exhibition?	
Collaboration partners, small and medium-sized companies with innovative ideas or products to increase health systems, processes and/or products. Companies must be located in Region Zealand and Greater Copenhagen.	
Contact data	
Company name: University College Absalon cvr-nr. 30 87 43 23 Contact person's name and title: Michelle Vestbo-Nielsen Management Consultant Address: Slagelsevej 70-74, 4180 Sorø Telephone: 72481463 E-mail: mive@pha.dk	

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Company name / project name	Company logo
GUIDEN65 faldGuirden	
What will we show at our exhibition stand?	**Project Picture**
GUIDEN65 rate welfare-technology products and services according to the quality of life they procure. faldGUIDEN shows fall related technologies and products. At the exhibition stand, we will engage users, relatives, visitors, companies and cares. They will be able to rate welfare-technology products and services online at the stand. Municipal staff, elderly people, their relatives and carers are lacking knowledge and overview of the many welfare-technology products and services, and their effects. Our method engages the users, relatives and caregivers, and ensure maximum involvement in choosing the best product.	
What differentiates us?	
faldGUIDEN is the first of its kind in Denmark. User ratings, feedback systems and direct exchanges between users/ customers are frequent in many other business areas but are not yet very developed within the field of health and care. faldGUIDEN is developed in direct co-creation with users, relatives, carers, companies and municipalities. Many companies will be represented on faldGUIDEN and many municipalities are interested in using faldGUIDEN to show technologies to their citizens.	
Contact data	
GUIDEN65, 40214178 Contact person's name and title: Esther Davidsen, CEO Address: Venture Village, Hermodsvej 5b, 8230 Aarhus Telephone: 31271930 E-mail: ed@guiden65.dk	

[Skriv her]

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Company name / project name	Company logo
imaginary srl / REHABILITY	
What will we show at our exhibition stand?	**Project Picture**
imaginary presents REHABILITY, a best practice connected and personalized health solution, that allows patients to take part in neurological rehabilitation therapy both within a specialist facility and from home with continuous remote medical support. Co-designed with specialists and patients, the product has proven research to show that it motivates elderly people to comply with the prescribed therapy, thus supporting therapy adherence. Details can be found on www.rehability.me	
What differentiates us?	
One of the longest established and most respected European Serious Games companies, imaginary, has always been a pioneering and innovative player with a key role in European Research: in this context imaginary designed and developed the **serious games** based system REHABILITY to motivate **neurological patients** adhere to **motor** and **cognitive rehabilitation** while medical staff can quickly personalize the exercises for each single patient in each phase of the therapy in a very fine grained, yet simple way. Awarded 6 international prizes and recognitions, the product is **culturally neutral** and **multi-lingual**, being able to address people from very many different countries from Europe to SE Asia. Given the wide acceptance of the system both from specialists and from patients, new versions of REHABILITY for **cardio** rehabilitation, for **pulmonary** rehabilitation and for **kids** are in progress. For ease of use and cost reduction, particularly for use @home, REHABILITY uses off-the-shelf affordable consumer technology: it runs alternatively on PC and different Android systems. The interface is displayed on monitors, projectors or standard TVs and it supports several motion tracking systems to "read" the patient's movements without the need of any wearable sensor.	
What do we look for at the exhibition?	
Customers: hospitals, clinics. rehab centres. NHS, town councils, care homes, daily centres.	
Contact data	
Lucia Pannese, CEO **imaginary s.r.l.** lucia.pannese@i-maginary.it www.i-maginary.it	

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Danish Healthtech

15 May 2019 – Exhibition at the Conference on Active and Healthy Ageing 2019

Conferencemanager.dk/AHA2019

Company name / project name	Company logo
InCare Systems A/S	InCare Tryghed og overblik – hele vejen
What do we offer/ our solution?	**Project Picture**
People with dementia require a special, individualized care that demands both professional knowledge, the structure of everyday life and, not least, in-depth knowledge of the person behind the disease. Who is the person? What story is behind it? What pleasures, sorrows and functionalities does the person have? And how are all these properties affected by the disease dementia?	

What differentiates us?

The system allows the citizen's personality, life assurance and how the needs described in Tom Kit wood's social psychological theories are best met. It provides a common academic language and framework of understanding among the staff and provides an instant visual overview of the individual citizen's well-being. It supports the staff in e.g. To assess which citizen needs extra focus, and which care efforts are optimal in relation to one

What do we look for?

We would like a partner in **Norway,** who could see the potential of our product.
Who have the professional knowledge, and contacts for sale in Dementia Care Centers.

Contact data

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Company name / project name	Company logo
Life Science Robotics	LSR LIFE SCIENCE ROBOTICS
What will we show at our exhibition stand?	**Project Picture**
Life Science Robotics will show ROBERT® - an innovative and ground-breaking rehabilitation robot focusing on mobilization of bedridden patients through active and passive training of the lower limbs. The robot provides both patients and healthcare professionals with better conditions for rehabilitation.	

What differentiates us?

Our focus is on efficient rehabilitation and early mobilization of bedridden patients through robot technology – this without compromising on quality.

ROBERT® is the only one of its kind and the collaboration between technology and healthcare professionals is unique. At the conference, we will present our new software module which will increase the potential of the rehabilitation robot even more. This means that the robot can be a greater asset to the healthcare staff and help the patients on another level.

What do we look for at the exhibition?

At the exhibition, we look forward to presenting the robot and its features. Furthermore, we hope to meet interested potential customers or partners – e.g. a hospital leader or head of rehabilitation centers. We also like to receive feedback from physiotherapists and other healthcare professionals.

Contact data

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www.lifescience-robotics.com

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Company name / project name	Company logo
Oliz – Aid for elderly dementia people	Oliz
What will we show at our exhibition stand?	**Project Picture**
People with dementia often have trouble during sleeping and finding calmness during the day. This is where our Sloth helps them in these situations. The weight calm them down. The sloth can be used when the person needs to go to sleep and miss the feeling of having another person in the room. The weight in the sloth gives comfort and safety for the dement person.	

What differentiates us?

We think in products with weight that have a positive effect for the stress full bodies, the weight in our products give pressure the right places and lower the arousal for the elderly. The sloth gives love, comfort, safety during the day and sleeping time, attention and lots of.

Our stand is unique because we "hide" the aid, so it doesn't exhibit the elderly in a bad way.

What do we look for at the exhibition?

We look for persons - Guests that works with elderly dementia people who can see the benefits that our products do to them. Who can help spread the word of Oliz. It could be people that works in community of all Denmark, Sweden, Norway, in general all of EU.

Contact data

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Company name / project name	Company logo
Rehaps	rehaps
What will we show at our exhibition stand?	**Project Picture**
Behovet for et hjælpemiddel opstår ofte akut, og da hjælpemidler er en offentlig opgave i Danmark, kan et stramt og tidskrævende bevillingssystem være en medvirkende årsag til, at mange vælger at købe et hjælpemiddel selv. Rehaps er en målrettet online portal, der formidler kontakt mellem køber og sælger af brugte, privatkøbte hjælpemidler. Rehaps gør det nemmere og billigere at skifte hjælpemidlet ud i takt med at behovet ændre sig.	

What differentiates us

Rehaps er en målrettet handelsportal til brugere og pårørende af hjælpemidler - og på sigt også en deletjeneste, hvor brugerne kan låne og leje hjælpemidler af hinanden. Mange brugere benytter et hjælpemiddel i en begrænset periode, hvilket betyder at restlevetiden på brugte hjælpemidler oftest er stor og de derved velegnet til genbrug.

What do we look for at the exhibition?

Networking og muligheden for at skabe kontakt til evt. samarbejdspartnere - indenlandske som udenlandske og en snak med investorer, vil være interessant i forhold til den videre udvikling af rehaps.

Contact data

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Company name / project name	Company logo
RotoBed RotoBed®Free - the new rotating carebed	RotoBed

What will we show at our exhibition stand?	Project Picture
RotoBed®Free offer users and staff an increased quality of life, less pain and a better working environment. With a RotoBed®Free, people who have difficulty getting in and out of bed, are now able to do so with no physical effort. Just by a single touch of a remote control the bed is elevated to chair position and rotated perpendicular towards the room.	

What differentiates us?

RotoBed® is designed by award-winning Danish furniture designer Hans Sandgren Jakobsen. Innovation, aesthetics and functionality are the three key words that Hans Sandgren Jakobsen himself emphasizes most during his design process. This fully agrees with RotoBed® and our desire to provide care beds that increase the user's quality of life and at the same time appear like domestic furniture.

What do we look for at the exhibition?

Contact data

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Company name / project name	Company logo
Safevent / Safegranny – make Denmark safe again	SAFE•VENT

What will we show at our exhibition stand?	Project Picture
We offer a highly efficient water mist system for detection and extinguishing of fires in nursing homes and households. This system consists of modules that allows the system to fit into any room and to be dismantled and reused. The system satisfies the need for fire safety among vulnerable and immobile citizens.	SAFE GRANNY

What differentiates us?

After the time of detection, our lifesaving water mist system can extinguish fires in 10 seconds. This makes it several times more efficient than regular sprinkler systems. In addition, the system uses only a small amount of water when extinguishing fires. This minimizes the consequential damages to furniture and buildings. Lastly, the system consists of modules that can put together to create an optimal fire protection solution that fits in any room. The exhibition's participants will want to visit our stand in their search for an affordable and great fire protection solution.

What do we look for at the exhibition?

The question of fire safety in nursing homes is currently an interesting subject for many Danish local authorities. We wish to inform these local authorities about the advantages of using a water mist for fire protection, compared to other, less effective solutions, on the market.

Contact data

Company name: Safevent, 38999605
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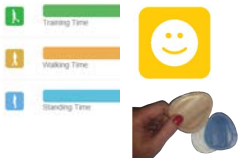
Company name / project name	Company logo
SENS motion® 'Objective measurement of physical (in)activity for clinical research and rehabilitation'	SENS motion®

What will we show at our exhibition stand?	Project Picture
The **SENS motion® system offers** a complete system for, large scale clinical research and rehabilitation. **An intelligent patch** measures physical activity for up to 14 days and does not require cumbersome charging or setup. Through a **motivational app**, SENS motion® improves the effect of the intervention and optimizes the economy for rehabilitation at the hospitals: - 10% on lower hospital readmissions - 30% on digital follow-up with patients (hours) - 10% on home care through effective rehabilitation	

What differentiates us?

SENS motion® supports rehabilitation and major research projects by objectively measuring the patients' training efforts and lifestyles 24/7. The patient mounts the SENS motion® patch and the physical activity profile is shared with healthcare professionals. The profile has been created with leading Danish researchers and doctors. Greater effect in rehabilitation for the same money. Scalable to larger citizen and patient groups. Affordable compared with other solutions on the market

What do we look for at the exhibition?

1. SENS motion® is used for research projects at 5 Danish hospitals and we are looking for new projects. The SENS motion® provide accurate measurement of physical activity with unique data interpretation and data export.
2. We cooperate with two other medical device manufacturers to combine some of their products with sensor technology, and we are interested in more collaborations in this area.

Contact data

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Company name / project name	Company logo
Company: Tele Call ApS Product: DoMyDay	TELE CALL DoMyDay

What will we show at our exhibition stand?	Project Picture
DoMyDay - a tool for mastering your own life. DoMyDay is a specially developed smartphone, which helps people with dementia to structure their day and helps them be more independent. DoMyDay is at the same time a communication tool, which helps the users keep in contact with their network. The functions in DoMyDay are individually picked to fit the user's actual needs. These functions are placed into the phone online by a helper by remote access.	

What differentiates us?

DoMyDay can be configured to meet the user's individual needs. Studies showed that an app solution couldn't meet the user's desire to be self-reliant for the longest time in their own home. The smartphone becomes a challenge in itself. Therefore, we have developed DoMyDay as a simple smartphone, with simple functions. The starting point is that the user is not able to perform the setup and insert appointments into the calendar himself. This is done remotely by an assistant who may be relatives or professionals.

What do we look for at the exhibition?

We are looking for customers e.g. municipalities who would like to complete implementation of our solution in their organization and help to prepare a plan for the implementation to succeed. We do also look for the opportunity to test our solutions in other contexts or audiences.

Contact data

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Company name / project name	Company logo
Trone Danmark Aps Increase quality of life, while you relax.	TroneDanmark
What do we offer/ our solution?	**Project Picture**
A Designed rockingchair / armchair with comfort, linia gliding motion you are controlling yourself. Trone Danmark chair can benefit many people for their general health and have proven to be a useful tool and increase quality of life for people suffering from dementia, ADHD, AUTISM and many other disorders where our Trone chair is a simple solution with many benefit.	
What differentiates us?	
It is a everyday product, there are made with understanding that every human being need to use their body everyday to stay healty and that it is back to grounding with a simple way of doing it without any drugs.We have case-histories and research study about the Trone Chair, but try for yourself, and make your own experience.	
What do we look for?	
To gain new knowledge of products there can be combined with our Trone Chair and to understand more of what features in a chair the age group from 60+ is looking for.	
Contact data	
Trone Danmark Aps: 33954522 Contact person: Lene Langhoff (Sales and Customer service Manager) Address: Drosselvangen 14, 3520 Farum Telephone: 0045 32 11 00 90 E-mail: salg@gyngestol.com	

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